TRANSACTIONS

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ALBANY INSTITUTE.

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TRANSACTIONS

OF THE

ALBANY INSTITUTE.

ART. 1. *Abstracts of Meteorological Observations made at the city of Albany, and calculations tending to establish its mean temperature*, by T. ROMEYN BECK, M. D.

Read February 7, 1833.

Several years have now elapsed since a regular series of meteorological observations was commenced in this place. I have supposed that it might be interesting to collect these, ascertain their mean results, and notice also the variations in each year.

The series is not, however, perfectly complete, being made at considerable intervals from each other. The earliest is the observations recorded by our venerable first vice-president, Simeon De Witt, for the years 1795 and 1796. These are to be found in the Transactions of the Society for the promotion of Agriculture, the Arts, &c. vol. 1, p. 287. They were made, as I am informed by him, in Dock (now Dean,) street.

Subsequent to this, tables were successively kept by the late Dr. Low and Dr. Eights. Those of the former are either unfortunately lost, or if preserved, are too imperfect to be available. Dr. Eights' comprise the years 1813 and 1814, and have been published in the 3d vol. of the Transactions of the Society for the promotion of Useful Arts. The Institute is also in possession, by donation from Dr. Eights, of the original MS. tables. I have carefully examined these, and the results have been accurately ascertained for this communication. They were made three times a day, viz at 7 A. M., 3 P. M. and 9 P. M.

The observations for 1813 were made, as I am informed by Dr. Eights, at the north side of Steuben-street, near Middle-Alley; those for 1814 in North Pearl-street, in the house south of and adjoining Judge Woodworth's.

From 1820 to 1832 inclusive, I have kept meteorological tables, at first, at the request of the corporation of the city, and latterly, under the direction of the Regents of the University. Having been noticed at the Academy, it of course will be observed that the ground here is many feet higher, and is also more exposed to the north and west winds than in either of the former localities.*

With this preamble, I propose in the first place to give the tabular results of each of the above seventeen years, and then to present such comparative views of the whole number as may appear important.

TABLE I.

Meteorological Observations for 1795 *and* 1796, *by* SIMEON DE WITT.

1795.	Mean temperature of each month.	Highest degree.	Lowest degree.	Greatest monthly variation.
January,	24.50	45	— 6	51
February,	27.00	46	—10	56
March,	37.00	66	20	46
April,	49.50	80	26	54
May,	62.00	85	35	50
June,	64.00	90	51	39
July,	74.50	96	54	42
August,	74.50	94	49	45
September,	63 00	91	43	48
October,	51 50	77	25	52
November,	37.50	65	18	47
December,	34 00	50	11	39

1796.	Mean temperature of each month.	Highest degree.	Lowest degree.	Greatest monthly variation.
January,	25.50	49	—10	59
February,	25.00	47	— 4	51
March,	31.00	55	4	51
April,	47.50	84	24	60
May,	56.50	77	32	45
June,	68.50	91	45	46
July,	72.50	92	54	38
August,	68.50	94	41	53
September,	62.00	86	37	49
October,	48.00	66	27	39
November,	.....	32	13	52
December,	20,00		—20	

Mr. De Witt states that the above results were deduced from the state of the thermometer at its two extremes, within each twenty-four hours.

* The Academy is one hundred and thirty feet above tide waters.

TABLE II.

Meteorological Observations for 1813, *by* JONATHAN EIGHTS, M. D.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)					WINDS, (NO. OF DAYS.)								
	Mean temperature at 7 A. M.	Mean temperature at 3 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest.	Greatest monthly range.	Greatest daily range.	Clear.	Cloudy.	Rain.	Snow.	Rain & Snow.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.	Prevailing wind.
January,	20.61	25.12	23.93	23.22	42	— 2	44	22	16.5	14.5	3	3	....	.5	1.5	.....	1.5	15	.....	11.5	1	South.
February,	20.10	27.32	26.42	24.61	40	— 2	42	20	12	16	...	3	1	.....	.....	....	.5	15	... .	11.5	1	South.
March,	26.61	33.10	31.35	30.35	50	6	44	22	14.5	16.5	5	2	...	3	1	1	3	9	.....	9.5	4.5	West.
April,	44.36	53.30	49.83	49.16	70	32	38	18	17	13	5	1	....	2	.....	.....	3.5	12.5	.. .	8 5	3.5	South.
May,	54.77	60.00	58.03	57.60	72	42	30	22	13	18	7	....	....	1.5	7	.....	5	5	.....	4.5	8	Northwest.
June,	64.20	72.66	67.76	68.21	82	52	30	20	18	12	6	....	....	.....	.5	. ...	5	13.5	.5	6	4.5	South.
July,	67.61	74.58	69.84	70.67	84	60	24	12	19.5	11.5	7	....	....	1	1	... .	2.5	10	.5	8	8	South.
August,	68.48	78.32	72.09	72.96	86	50	36	18	24.5	6.5	2	....	...	2.5	1.5	.....	7.5	7.5	1.5	1.5	9	Northwest.
September,	61.10	69.83	64.53	65.15	87	48	39	19	20.5	9.5	6	....	....	3	2	1	2.5	8	.....	6	7.5	South.
October,	46.51	52.87	49.29	49 55	66	30	36	14	12.5	18.5	11	2	1	1	.5	. ...	9.5	9	.5	3.5	7	Southeast.
November,	37.20	44.36	39.70	40.42	60	18	42	20	12	18	5	3	...	7.5	1.5	.....	2	8.5	.....	3	7.5	South.
December,	26.67	30.71	27.94	28.44	44	12	32	14	15.5	15.5	....	3	....	3	.....	.....	.5	7	.....	10.5	10	West.

TABLE III.

Meteorological Observations for 1814, *by* JONATHAN EIGHTS, M. D.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)					WINDS, (NO. OF DAYS.)								
	Mean temperature at 7 A. M.	Mean temperature at 3 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest.	Greatest monthly range.	Greatest daily range.	Fair.	Cloudy.	Rain.	Snow.	Rain & Snow.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.	Prevailing wind.
January,	19.87	25.54	22 35	22.58	36	— 6	42	18	12.5	18.5	....	1	1	3	.5	.....	.5	9	.5	4	13.5	NW.
February,	24.96	32.18	29.57	28.90	47	— 6	53	36	10	18	3	3	1	3.5	.5	... .	5	7.5	1	6.5	4	S.
March,	28.67	38.55	34.39	33.87	60	7	53	24	15.5	15.5	3	3	....	1	1	1	6.5	9.5	... .	6	6	S.
April,	43.10	54.46	49.06	48.87	78	30	48	26	17	13	7	....	....	3	.5	.....	5	10	.....	3	8.5	S.
May,	58.74	67.84	62.55	63.04	83	44	39	22	15.5	15.5	11	....	....	2	1	.5	10.5	5	.....	1	11	NW.
June,	64.76	74.26	68.40	69.14	82	52	30	18	24	6	4	....	....	6.5	2	.....	6	9	.....	1	5.5	S.
July,	67.84	76.48	71.22	71.84	84	52	32	20	21	10	9	....	....	1	.....	.. .	2	15.5	1	7.5	4	S.
August,	67.00	75.84	70.67	71.17	86	52	34	16	22	9	9	....	....	.5	.....	.....	.5	13	.....	7	10	S.
September,	59.06	66.50	63.06	62.87	84	46	38	18	11	19	13	....	....	3.5	1.5	.....	1.5	10.5	1.5	5	6.5	S.
October,	48.51	57.58	53.26	53.11	70	34	36	18	19.5	11.5	5	....	....	2.5	1	.5	1.5	11	1	5.5	8	S.
November,	39.90	44.83	42.80	42.51	60	22	38	20	9	21	8	1	2	.5	.....	. ..	2.5	15.5	.....	2.5	9	S.
December,	28.64	32.19	29.93	30.25	42	2	40	18	10	21	2	3	1	1.5	1	... .		9	.....	6	13	NW.

TABLE IV.

Meteorological Journal for the year 1820.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)					WINDS, (NO. OF DAYS.)							Prevailing wind.
	Mean temperature at 7 A. M.	Mean temperature at 2 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest.	Greatest monthly range.	Greatest daily range.	Fair.	Cloudy.	Snow.	Rain.	Rain & Snow.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.	
January,.	17.19	27.51	20.48	21.73	37	— 3	40	24	11.5	19.5	6	....	....	4.5	.....	1	6	8	2.5	7	2	S.
February, ...	24.69	36.72	28 48	29.96	56	— 5	61	31	13	16	5	6	...	4.5	.5	.....	2	8	2	8	4	S&W.
March, ...	27.71	39.96	30.51	32.73	69	9	60	29	11.5	19.5	5	3	2	6.5	1	.5	.....	9	.....	10	4	W.
April,.....	42.36	62.50	47.70	50.85	85	21	64	36	4.5	15.5	2	9	....	7	.5	1.5	5	6.5	1	7	1.5	N&W.
May,.....	52.77	69.87	56.32	59.65	85	44	41	36	17.5	23.5	....	14	....	2.5	2.5	1.5	7.5	5	1.5	5.5	5	SE.
June,.....	63.86	80.80	69.96	71.54	98	48	50	32	17.5	12.5	....	4	....	2	1	....	6	8	.5	7	5.5	S.
July, ...	71.32	85.42	76.00	77.58	100	63	37	25	16.5	14.5	....	13	..	...	2	.5	14.5	4.5	1	3.5	5	SE.
August, ...	65.42	79.06	70.45	71.64	89	54	35	31	16	15	....	12	....	2	.....	.....	6	8	.....	8	7	S&W.
September,.....	48.40	72.83	64.03	65.08	90	38	52	24	15.5	14.5	....	5	..	.5	.5	1.5	9	6.5	1.5	6.5	4	SE.
October,.....	43.32	54.41	47.54	48.42	71	27	44	23	11	20	3	11	....	3	1	1	3.5	7.5	.5	9.5	5	W.
November, ...	31.23	40.03	34.30	35.18	56	11	45	18	10.5	19.5	2	5	....	1	.5	.....	2.5	11.5	1.5	10	3	S.
December,.....	20.61	26.67	23.03	23.44	39	2	37	11	9.5	21.5	5	3	....	10.5	.5	.....	1.5	6.5	.....	5.5	6.5	N.

TABLE V.

Meteorological Journal for the year 1821.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)					WINDS, (NO. OF DAYS.)								
	Mean temperature at 7 A. M.	Mean temperature at 2 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest.	Greatest monthly range.	Greatest daily range.	Fair.	Cloudy.	Snow.	Rain.	Rain & Snow.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.	Prevailing wind.
January,.....	12.90	21.77	17.74	17.47	48	—14	62	20	11	20	8	1	....	4	... .	.....	3	10	2.5	5.5	6	S.
February, ...	26.14	34.35	30.10	30.20	45	12	33	19	7.5	20.5	8	1	....	1.5	.5	.....	5	5.5	1	10	4.5	W.
March, ...	26.93	38.48	32.22	32.54	54	9	45	24	14	17	6	5	2	2	.....	.....	2.5	8.5	2.5	13	2 5	W.
April, ...	37.83	50.30	42.16	43.43	71	22	49	27	14.5	15.5	8	7	....	2	1	.....	4 5	8.5	.5	9.5	4	W.
May,.....	53.16	67.80	58.25	59.74	77	43	34	26	15	16	....	12	....	3	1.5	1.5	6	5.5	.5	7.5	5.5	W.
June,.....	64.50	78.36	69.33	70.73	90	51	39	27	19	11	....	10	....	4	3	.5	9	5.5	.....	3.5	4.5	SE.
July,..... .. .	64.54	79.26	70.58	71.46	93	54	39	23	16.5	14.5	....	8	....	3.5	.....	1	4.5	9	1	8.5	3.5	S.
August, ...	65.54	81.74	71.26	72.84	93	55	38	28	20	11	....	7	....	8	.5	2	6.5	3	.....	10	1	W.
September, ...	59.53	71.40	63.06	64.66	83	42	41	24	16	14	....	13	...	2	.....	.5	5	8.5	3	7.5	3.5	S.
October, ...	43.45	57.06	48.16	49.55	71	28	43	25	21.5	9.5	....	9	....	1	1	.....	5.5	8	2	8	5.5	S&W.
November,.....	35.86	42.50	37.53	38.63	55	19	36	17	6.5	23.5	4	10	....	.5	.....	1	4	4	4	12.5	4	W.
December,.....	21.29	31.32	24.93	25.85	43	— 2	45	18	19	12	6	.....	1	2	1	.....	3	6.5	4	3	11.5	NW.

TABLE VI.

Meteorological Journal for the year 1822.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)					WINDS, (NO. OF DAYS.)								
	Mean temperature at 7 A. M.	Mean temperature at 2 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest.	Greatest monthly range.	Greatest daily range.	Fair.	Cloudy.	Snow.	Rain.	Rain & Snow.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.	Prevailing wind.
January,	13.96	22.77	17.58	18.10	38	—14	52	20	14	17	5	....	....	3	1	.....	2	9 5	1.5	6	8	S.
February,	19.50	30.89	24.75	25.04	51	4	47	27	14.5	13.5	6	4	....	5	1	.....	.....	12.5	.5	3.5	5.5	S.
March,	30.96	44.67	35.80	37.15	58	11	47	27	16.5	14.5	4	5	....	4.5	.5	.....	1.5	11	.5	11	2	S&W.
April,	41.00	53.46	45.06	46.51	72	27	45	23	12	18	1	11	1	3.5	.. ..	.....	2.5	13	1	6.5	3.5	S.
May,	55 32	70.74	60.61	62.22	85	43	42	27	18	13	....	7	....	4	2.5	.5	7.5	8.5	.5	6	1.5	S.
June,	64.16	78.63	66.93	69.91	88	48	40	27	19	11	....	7	....	1	3	.5	11.5	2.5	.....	9.5	2	SE.
July,	68.84	81.22	71.93	74.00	90	56	34	21	18	13	....	14	...	1.5	2	1.5	7.5	8	.....	3	7.5	S.
August,	64.22	78.87	66.38	69.82	86	52	34	21	21	10	...	6	....	5.5	3	1	3.5	13	.5	3	1.5	S.
September,	58.83	73.43	64.10	65.45	84	41	43	30	15	15	...	10	....	3	.5	1.5	6	11.5	.....	6.5	1	S.
October,	46.16	58.38	49.93	51.49	71	30	41	26	14	17	....	10	....	1	1	.....	7	4	.....	9.5	8.5	W.
November,	38.00	46.90	42.10	42.33	58	26	32	23	11	19	1	13	....	2	1	.....	6.5	7.5	2.5	5	5.5	S.
December,	25,35	32,12	27,09	28,19	56	10	46	18	16	15	4	4	.....	4	.....	.....	7.5	6	2.5	8.5	2.5	W.

TABLE VII.

Meteorological Journal for the year 1823.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)						WINDS, (NO. OF DAYS.)								
	Mean temperature at 7 A. M.	Mean temperature at 2 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest	Greatest monthly range.	Greatest daily range.	Fair.	Cloudy.	Snow.	Rain.	Rain & Snow.	Rain gage.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.	Prevailing wind.
January,.	20.42	28 00	23.58	24.00	40	— 5	45	22	25	6	6	3	....	...	9.5	.....	.....	2	7.5	.....	6	7	S.
February, ...	14.28	25.03	18.53	19.28	39	— 6	45	25	14.5	13.5	10	....	...	....	5.5	2	.5	1.5	2.5	.5	9.5	6	W.
March, ...	27.29	36.32	31.67	31.76	51	— 4	55	23	13	18	4	3	2	....	3	1	.5	3	7	1	8	7.5	W.
April, ...	42.80	56.80	47.73	49.11	68	26	42	27	13.5	16.5	....	7	....	1.11	2.5	1.5	.....	5	9.5	.....	5.5	6	S.
May,.....	52.74	65.00	56.64	58.12	86	36	50	22	14	17	2	9	....	3.23	3.5	1.5	.....	4	8	2.5	11	.5	W.
June,.....	60.33	78.80	66.67	68.60	93	47	46	30	23	7	....	6	....	0.72	2	1	1	10.5	4	1	4.5	6	SE.
July, ...	68.32	81.90	73.06	74.43	94	59	35	24	20	11	....	10	....	3.37	.....	1	.....	12 5	5	1	5.5	6	SE.
August, ...	65.51	78.93	70.58	71.67	92	54	38	26	20	11	.. .	7	...	2.97	1.5	1.5	1	11.5	4	1.5	5	5	SE.
September,....	53.36	67.23	58.30	59.63	83	33	50	27	16	14	....	4	....	3.56	3	1	.....	7.5	4	1.5	8	5	W.
October,.....	41.87	53.09	46.48	47.15	74	30	44	30	14.5	16.5	1	6	1	4.12	2.5	1	.....	11	3.5	1	7.5	4.5	SE.
November,....	30.66	37.86	34.00	34.17	48	16	32	17	13.5	16 5	2	4	....	1.13	6.5	.5	.....	6.5	4.5	1	6.5	4.5	N&SE.
December,....	27.00	32.58	29.96	29.84	47	12	35	14	11.5	19.5	7	5	....	....	3.5	1	.....	8	5	2	5	6.5	SE.

TABLE VIII.

Meteorological Journal for the year 1824.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)						WINDS, (NO. OF DAYS.)								
	Mean temperature at 7 A. M.	Mean temperature at 2 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest.	Greatest monthly range.	Greatest daily range.	Clear.	Cloudy.	Snow.	Rain.	Rain & Snow.	Rain gage.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.	Prevailing wind.
January,.....	24 87	31.25	27.06	27.73	41	7	34	19	10.5	20.5	5	5	....	....	3.5	.5	....	6.5	4	4.5	3	9	NW.
February, ...	22.24	31.31	26.10	26.55	57	— 3	60	24	15	14	6	3	....	....	2	1	.....	10	5	1.5	6.5	3	SE.
March,.....	27.55	39.16	32.29	33.00	54	14	40	24	16	15	5	5	....	....	1	1.5	....	8	2.5	3	4	11	NW.
April,..... ..	40.53	54.53	45.23	46.76	75	27	48	30	18.5	11.5	...	8	...	3.16	1	1	1	8.5	3.5	5.5	5.5	4	SE.
May,..... ..	47.29	64.22	53.19	54.90	80	33	47	30	18.5	12.5	....	9	....	1.80	2	2	.....	10.5	3.5	4	3.5	5.5	SE.
June,.....	59.67	73.83	63.83	65.77	89	48	41	27	16	14	....	13	....	3.83	1.5	1.5	.5	12.5	1.5	3.5	3.5	5.5	SE.
July,.....	64.32	77.80	67.64	69.92	86	56	30	25	17.5	13.5	....	10	....	4.84	2	2.5	.....	7	5	4	4	6.5	SE
August, ...	61.61	75.09	67.12	67.94	84	49	35	25	17.5	13.5	....	6	....	3.34	4	2	.....	9.5	4.5	1	4	6	SE.
September,....	55.23	70.30	60.70	62.07	84	41	43	27	19	11	....	7	...	2.80	6.5	.5	.5	6	3.5	1.5	2.5	9	NW.
October,.....	45.22	57.12	48.45	50.26	67	32	35	22	18	13	...	4	1	2.09	1	1	1	8.5	3	3.5	5	8	SE.
November,....	34.30	40.96	36.63	37.30	58	24	34	17	11.5	18.5	....	7	....	....	3	2	.....	7.5	5	4	5	3.5	SE.
December,....	29.71	35.58	32.06	32.45	50	13	37	17	9.5	21.5	3	5	....	....	3.5	1.5	.....	6	7.5	3	5	4.5	S.

TABLE IX.

Meteorological Journal for the year 1825.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)						WINDS, (NO OF DAYS.)								
	Mean temperature at 7 A. M.	Mean temperature at 2 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest.	Greatest monthly range.	Greatest daily range.	Clear.	Cloudy.	Snow.	Rain.	Rain & Snow.	Rain gage.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.	Prevailing wind.
January,.....	22.51	30.06	25.16	25.91	40	6	34	25	11.5	19.5	3	2	....	....	5.5	1	.....	3	9	3	3.5	6	S.
February, ...	23.35	32.17	27.64	27.72	44	3	41	21	10	18	4	3	1	....	6	2	....	2.5	5.5	2.5	3.5	6	N&Nw.
March,.....	33.80	45.78	38.74	39.44	63	25	38	23	17	14	1	3	2	....	9.5	1	.5	4	2	2	6	6	N.
April, ...	42.13	57.87	48.90	49.68	72	29	43	30	16.5	13.5	....	5	....	....	8	.5	1	2.5	6	2	4.5	5.5	N.
May,.....	52.74	70.19	59.32	60.75	82	37	45	28	22.5	8.5	....	4	....	1.21	5.5	3.5	....	1	11.5	3	3	3.5	S.
June,.....	66.30	80.10	71.53	72.64	98	57	41	24	21.5	8.5	....	7	....	5.78	3.5	....	.....	5	8.5	4.5	5	3.5	S.
July, ...	69.19	85.42	76.61	77.07	96	60	36	24	24	7	....	6	....	1.13	.5	1.5	.5	6.5	7	6	4.5	4.5	S.
August, ...	65.03	79.74	71.38	72.05	89	55	34	26	22.5	8.5	....	9	....	6.43	5	2.5	.....	4.5	6.5	1.5	2	9	NW.
September,....	54.63	67.43	59.06	60.37	77	41	36	24	15	15	....	6	...	0.97	2.5	2	1	4.5	5.5	3.5	5.5	5.5	NW.
October,.....	48.03	58.41	51.93	52.79	79	29	50	23	17	14	....	6	....	4.91	4	1.5	.....	6	8.5	1.5	3.5	6	S-
November, ...	32.50	43.20	35.83	37.17	58	17	41	22	17	13	2	2	....	1.48	4.5	3.5	.....	2.5	7.5	3.5	3	5.5	S.
December,....	27.29	33.35	29.64	30.09	48	— 6	54	20	14.5	16.5	3	3	1	2.31	4.5	.....	.....	6	6	7 -	4	3.5	SW.

TABLE X.

Meteorological Journal for the year 1826.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)						WINDS, (NO. OF DAYS.)								
	Mean temperature at 7 A. M.	Mean temperature at 2 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest.	Greatest monthly range.	Greatest daily range.	Clear.	Cloudy.	Rain.	Snow.	Rain & Snow.	Rain gage.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.	Prevailing wind.
January,.....	25.67	31.09	26.45	27.74	54	— 3	57	21	12	19	4	4	....	2.43	4	.....	.....	2	11	4	6.5	3.5	S.
February, ...	24.35	36.07	28.96	29.79	53	—12	65	24	13.5	14.5	4	5	1	1.36	3.5	.5	.....	3	8.5	2.5	6	4	S.
March, ...	31.96	44.77	36.54	37.75	69	13	56	28	13.5	17.5	5	2	2	3.81	5.5	.....	.....	3	8	1.5	10.5	2.5	W.
April, ...	37.66	52.93	42.60	44.40	76	22	54	36	18	12	6	3	...	1.77	3.5	.....	.....	4.5	6	3.5	7	5.5	W.
May,.....	58.16	75.93	65.38	66.49	92	45	47	28	23	8	4	....	....	0.76	7	.5	.5	5.5	7	3	4	3.5	N&S.
June,.....	65.23	76.23	70.03	70.50	86	56	30	26	14	16	12	....	....	6.22	1.5	1.5	.....	8.5	8.5	6	1	3	S&SE.
July, ...	67.06	79.70	72.58	73.11	90	56	34	22	24	7	7	...	....	5.53	3.5	1	.5	9.5	6	1	3.5	6	SE.
August, ...	65.90	78.12	71.35	71.79	86	56	30	24	20.5	10.5	8	....	....	2.46	3	5.5	.5	4.5	3	1.5	5	8	NW.
September,....	59.03	70.00	62.96	64.00	82	44	38	23	17	13	9	....	....	3.58	6	3	.5	8	5	1.5	3.5	2.5	SE.
October,.. . .	47.06	57.58	51.12	51.92	72	31	41	23	21.5	9.5	7	....	....	2.37	4.5	.....	.....	5.5	6	2.5	7	5.5	W.
November,...	36.63	43.03	39.56	39.74	58	25	33	16	18	12	8	1	....	1.56	2	.5	... .	5	7.5	5	6	4	S.
December,....	25.90	32.25	28.64	28.93	52	— 5	57	18	14.5	16.5	3	6	....	1.27	2.5	.5	.....	1.5	8	2	10.5	6	W.

TABLE XI.

Meteorological Journal for the year 1827.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)						WINDS, (NO. OF DAYS.)								
	Mean temperature at 7 A. M.	Mean temperature at 2 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest.	Greatest monthly range.	Greatest daily range.	Clear.	Cloudy.	Rain.	Snow.	Rain & Snow.	Rain gage.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.	Prevailing wind.
January,.....	11.84	22.64	17.00	17.16	39	—18	57	25	15.5	15.5	2	10	....	5.40	13	.....	.5	1	.5	1.5	7	3.5	N.
February, ...	22.68	31.85	26.78	27.10	43	— 8	51	24	14	14	2	3	1	3.07	3	.....	.....	3	11	5	4	2	S.
March,.....	30.35	43.16	35.67	36.39	68	8	60	27	21	10	5	2	1	2.38	5	.....	.....	.....	12	4	8.5	1.5	S.
April,..... ...	49.10	59.26	43.87	50.74	76	33	43	32	18	12	8	....	1	4.66	3.5	.5	.....	1.5	15	3.5	3.5	2.5	S.
May,..... . ..	52.51	67.16	58.54	59.40	82	37	45	29	22.5	8.5	7	...	1	3.43	10	1	.....	1	11	3	2.5	2.5	S.
June,.....	61.70	75.33	66.43	67.82	85	51	34	22	22	8	9	....	....	3.75	3	.5	.....	.5	15	2	3	6	S.
July,.....	67.13	79.32	71.77	72.74	86	60	26	20	23.5	7.5	10	...	....	5.43	3	.5	.....	6	10	1.5	5	5	S.
August, . .	64.25	75.51	68.77	69.51	90	52	38	21	20.5	10.5	9	....	....	4.69	4.5	1	1.5	3	9.5	1.5	4.5	5.5	S.
September, ...	56.73	67.23	60.90	61.62	80	42	38	21	18	12	7	....	....	5.67	6	3	.5	1	5	.5	5	9	NW.
October,.....	47.80	56.26	50.38	51.48	66	33	33	31	17	14	10	....	...	4.65	4	1	.....	3.5	7.5	1.5	7.5	6	S.
November,....	31.90	36.50	33.23	33.87	52	22	30	15	12.5	17.5	3	3	2	2.76	2	1.5	... .	1	5	4	10.5	6	W.
December,....	28.12	32.03	29.16	29.77	46	3	43	15	11	20	7	4	...	3.91	7.5	1	.....	1.5	8.5	3	5	4.5	S.

TABLE XII.

Meteorological Journal for the year 1828.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)						WINDS, (NO. OF DAYS.)							
	Mean temperature at 7 A. M.	Mean temperature at 2 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest.	Greatest monthly range.	Greatest daily range.	Fair.	Cloudy.	Rain.	Snow.	Rain & Snow.	Rain gage.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.
January,. ...	27.58	33.06	29.12	29.92	45	0	45	....	12	19	5	6	....	2.25	5	1	.....	3	9	4.5	5.5	3
February, ...	31.72	38.38	34.34	34.81	55	18	37	....	15	14	6	4	....	2.53	3	.....	1	2	11.5	2	6	3.5
March, ...	33.58	44.48	37.67	38.58	68	19	49	....	19.5	11.5	5	....	3	1.94	3.5	1	1	1	11	2	4	7.5
April,.....	39.40	51.90	43.53	44.94	62	31	31	....	19	11	10	....	2	2.52	9.5	.....	1	1	6	4	5	3.5
May,.....	55.28	67.38	59.64	60.87	78	46	32	....	18.5	12.5	11	....	....	4.48	1.5	.....	.5	4.5	10.5	2.5	6	5.5
June,.....	67.66	79.77	72.14	73.19	88	54	34	....	22	8	10	....	....	2.87	2.5	.5	.5	3	18.5	2	2.5	.5
July, ...	67.16	79.06	67.87	71.36	95	59	36	....	19.5	11.5	17	....	....	5.40	1	1	.....	1.5	16	2	7	2.5
August, ...	65.03	85.42	69.61	73.35	98	54	44	....	26	5	4	....	....	0.88	.5	2	.5	2.5	11.5	1.5	8	4.5
September,....	57.10	70.30	59.17	62.19	89	47	42	....	16	14	11	....	....	8.08	2	.5	1.5	1	11	3	2.5	8.5
October,.....	41.51	58.38	46.03	48.64	75	23	52	....	22	9	6	..	....	1.56	2	...	.....	.....	12.5	2	5.5	9
November, ...	37.37	44.97	38.70	40.34	64	18	46	...	13	17	10	3	1	4.91	2	....	1	2	8.5	2.5	4	10
December,....	30.77	40.19	32.74	34.57	54	5	49	....	20.5	10.5	3	...	....	0.24	3	.....	.....	1	14	1.5	10	1.5

TABLE XIII.

Meteorological Journal for the year 1829.

	THERMOMETER.								WEATHER, (NO. OF DAYS.)						WINDS, (NO. OF DAYS.)							
	Mean temperature at 7 A. M.	Mean temperature at 2 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest.	Lowest.	Greatest monthly range.	Greatest daily range.	Fair.	Cloudy.	Rain.	Snow.	Rain & Snow.	Rain gage.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.
January,.....	19.58	28.71	20.64	22.97	48	—10	58	....	13	18	3	5	2	4.56	9.5	... .	.....	1	6.5	.....	6	8
February, ...	13.28	27.75	18.92	19.98	42	— 5	47	...	17	11	1	5	1	3.26	3.5	2.5	.....	.....	4.5	1.5	6.5	9.5
March, ...	26.06	40.64	31.00	32.57	59	14	45	....	14.5	16.5	2	3	1	2 78	4.5	2 5	.....	.....	6.5	2.5	11.5	3.5
April, ...	40.87	57.73	45.56	48.05	78	32	46	....	17	13	10	....	1	4.77	2	.5	.5	.5	10.5	3	8	5
May,..... ..	56.61	74.19	61.71	64.17	90	40	50	....	24.5	6.5	7	....	...	2.68	2.5	1	.....	5.5	11	2	5.5	3.5
June,.....	62.76	76.86	64.47	68.03	86	54	32	...	21.5	8.5	11	....	....	3.90	2	1	.....	3	12.5	3	6	2.5
July,.....	63.26	76.88	61.71	67.28	85	55	30	....	18.5	12.5	11	....	....	3.22	1	1	1	4	10	3	1.5	9.5
August, ...	62.19	80.93	66.00	69.71	87	49	38	....	21.5	9.5	5	....	....	1.46	.5	1	.....	3.5	12.5	2	6	5.5
September, ...	50.23	65.17	55.60	57.00	84	38	46	....	19	11	9	....	....	2.73	... .	.5	.5	6.5	4	2.5	11.5	4.5
October, ...	44.38	59.74	49.71	51.28	74	29	45	....	21	10	5	....	....	2.41	1.5	.5	.5	9.5	7.5	.5	4	7
November,....	36.37	45.03	37.16	39.52	58	23	35	....	12.5	17.5	7	4	1	3.86	1.5	1	.5	1.5	8.5	2.5	8	6.5
December,....	34.35	41.45	35.06	36.95	58	15.	43	....	15.5	15.5	8	3	....	2.44	.5	.....	... .	.....	12	3.5	5.5	9.5

In 1825, the Regents of the University required meteorological observations to be made in each of the Academies under their care. These were directed to be taken between daylight and sunrise, as showing the lowest degree of temperature in the twenty-four hours; between 2 and 4 P. M., or in other words, at 3 P. M., as the warmest point, and every evening an hour after sunset. The mean was to be ascertained by adding to the morning's observation twice the afternoon's and evening's and that of the next morning. The sum of these four was to be divided by six, and the result placed in the mean column. The mean of each half month and month was also to be calculated.

I continued both these series of observations (at 7 A. M., 2 P. M. and 9 P. M., and according to the mode directed by the Regents,) for the years 1826, 1827, 1828 and 1829, in order to ascertain the discrepancies, if any, that might exist between them. After the last named year, finding both too laborious, I continued only that which was directed by the Regents. The following tables show the results obtained.

TABLE XIV.

Meteorological Journal for 1830.

	THERMOMETER.						WEATHER, (NO. OF DAYS.)						WINDS, (NO. OF DAYS.)							
	Mean. 1st half.	Mean. 2d half.	Monthly mean.	Highest.	Lowest.	Greatest monthly range.	Clear.	Cloudy.	Rain.	Snow.	Rain & Snow.	Rain gage.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.
January,	30.22	18.90	24.56	45	— 8	53	15	16	2	10	1	1.76	3	....	....	.5	9.5	3	8	7
February,	14.81	34.83	24.82	55	—12	67	16.5	11.5	2	7	....	1.41	.5	.5	.....	1.5	6.5	3	4.5	11.5
March,	33.54	42.57	38.05	70	14	56	15.5	15.5	8	5	1	4.86	4.5	.5	.5	3	8.5	2	4.5	7.5
April,	51 71	60.32	56.02	88	31	57	19.5	10.5	7	....	....	2.37	3.5	2	.....	1.5	9.5	1.5	1	11
May,	60.33	58.21	59.27	87	30	57	21	10	10	...	....	4.63	2	.5	.....	3	12.5	2	2	9
June,	65.75	66.22	65.98	85	50	35	17.5	12.5	15	....	....	7.58	2	.5	. ...	1	14	2	3.5	7
July,	69.93	77.80	73.86	97	56	41	22.5	8.5	11	....	....	2.37	2.5	1	... .	5	10.5	4.5	1.5	6
August,	71.79	69.24	70.52	87	52	35	25	6	6	....	....	1.55	2	1	.....	5	6	2	5.5	9.5
September,	64.14	59.51	61.82	84	35	49	20	10	6	....	....	.93	3.5	.....	.....	3.5	8	.....	6	9
October,	55.24	49.55	52.39	74	33	41	19	12	9	....	..	3.15	1	3.5	1	6	5	4	4	6.5
November,	49.90	43.45	46.67	69	34	35	22	8	8	....	4	7.29	4.5	1.5	.....	1	6.5	2	4.5	10
December,	35.84	31.90	33.87	49	6	43	12	19	9	9	2	3.95	1	1	.5	5.5	6	2	5	10

TABLE XV.

Meteorological Journal for the year 1831.

	THERMOMETER.						WEATHER, (NO. OF DAYS.)						WINDS, (NO. OF DAYS.)							
	Mean. 1st half.	Mean. 2d half.	Monthly mean.	Highest.	Lowest.	Monthly range.	Clear.	Cloudy.	Rain.	Snow.	Rain & Snow.	Rain gage.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.
January,	25.70	16 34	21.02	55	—10	65	17.5	13.5	1	7	1	1.88	4	.....	. ..	1.5	5	1.5	10	9
February,	19.62	25.88	22.75	44	— 2	46	16 5	11.5	1	4	1	4.17	3	....	.....	4	3	1.5	8.5	8
March,	39.75	42.46	41.11	66	18	48	16.5	14.5	9	2	. ..	2.38	4	.....	... .	2	13.5	.....	8.5	3
April,	50.25	53.91	52.08	80	32	48	15	15	12	1	....	4 59	.5	2.5	.5	1.5	10	3.5	4.5	7
May,	57.20	67.12	62.16	89	36	53	17.5	13.5	12	1	....	2.38	.5	1	.....	1	15	2	4	7.5
June,	74.60	71.03	72.81	94	48	46	18	12	11	....	....	4.04	.5	.5	.....	2.5	14.5	2.5	2.5	7
July,	72.11	73.43	72.77	90	50	40	19.5	11.5	10	....	....	4.32	.5	1	.5	.....	18.5	1.5	4.5	4.5
August,	71.67	72.72	72.19	91	50	41	22	9	8	....	....	3.25	3 5	2	.....	4	6	2.5	2	11
September,	66.35	60.93	63.64	86	43	43	12	18	9	...	....	3.93	.5	1	... .	10.5	4	3	4.5	6.5
October,	52.79	52.43	52.61	76	29	47	20	11	11	....	....	4.82	1.5	1	.....	1	12	.5	5.5	9.5
November,	42.84	36.12	39.48	56	21	35	15	15	5	1	2	1.71	.....	....	.. .	1.5	6.5	5.5	13.5	3
December,	16.82	17.52	17.17	37	0	37	17	14	....	9	....	1.57	3	.....	... .	.....	9	7.5	2.5	9

TABLE XVI.

Meteorological Journal for the year 1832.

	THERMOMETER.						WEATHER, (NO. OF DAYS.)						WINDS, (NO. OF DAYS.)							
	Mean. 1st half.	Mean. 2d half.	Monthly mean.	Highest.	Lowest.	Monthly range.	Fair.	Cloudy.	Rain.	Snow.	Rain & Snow.	Rain gage.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.
January,	25.40	23.31	24.35	50	— 8	58	16	15	2	7	1	4.21	6	....	.....	1	13	2	5	4
February,	25 24	21.01	23.12	44	—11	55	10.5	18.5	3	5	3	3.12	10.5	.5	... .	.....	8.5	.5	5.5	3.5
March,	35.29	35.17	35.23	63	8	55	20.5	10.5	5	2	2	2.59	1	1.5	.....	.....	13.5	.5	7.5	7
April,	42.96	46.91	44.93	79	18	61	17 5	12.5	9	.....	.....	2.90	2	3	.....	3.5	6.5	1	3	11
May,	58.51	54.94	56.72	86	38	48	17.5	13.5	8	....	.. .	2.69	2	3	.....	2.5	10	2	2.5	9
June,	65.54	71.41	68.47	91	49	42	22	8	8	....	....	3.57	2.5	.5	.....	2	12	1	2.5	9.5
July,	71.65	70.91	71.28	91	56	35	16.5	14.5	12	....	....	4.28	1.5	2	.....	8	9	2	5	3.5
August,	73.45	64.99	69.22	90	46	44	17	14	12	....	....	7.51	1	2	.5	6	10.5	4	.5	6.5
September,	60.65	64.52	62.58	86	42	44	21.5	8.5	11	....	....	2.76	.5	1	.....	3.5	12	2	5.5	5.5
October,	54.21	47.22	50.71	69	27	42	17	14	8	....	...	4.20	.5	2	.....	4.5	9.5	.5	3.5	10.5
November,	41.37	39.92	40.65	59	22	37	13.5	16.5	6	2	2	3.28	2	.5	.....	2	13.5	1.5	4	6.5
December,	33.30	26.71	30.00	44	6	38	11	20	4	6	1	3.34	2.5	1	.....	1	8	.5	8	10

In comparing the previous tables, it may be well to premise the remark, that this city is situated in north latitude 42°39 and west longitude 73°44.

The following schedule (table XVII.) brings together the respective observations, so far as they can be compared with each other. As I have already explained the cause of the partial vacancies in the years in 1830, '31 and '32, I may here state that table XVIII. exhibits the variations noticed in pursuing the double sets of observations made in 1826, '27, '28 and '29. It will be seen that on the annual mean they hardly differ half a degree. Indeed during three of the years the difference is less.

TABLE XVII.

*Comparative view of the Annual Temperature, &c.**

Years.	THERMOMETER.									WEATHER, (NO. OF DAYS.)						WINDS, (NO. OF DAYS.)								Prevailing wind.
	Mean temperature at 7 A. M.	Mean temperature at 2 P. M.	Mean temperature at 9 P. M.	Mean of all the observations.	Highest	Lowest.	Greatest daily range.	Greatest monthly range.	Greatest annual range.	Clear.	Cloudy.	Rain.	Snow.	Rain & Snow.	Rain gage.	North.	N. East.	East.	S. East.	South.	S. West.	West.	N. West.	
1795	.....	... .	.....	50.00	96	—10	....	....	106	.....	.....	....	..	..	.....									
1796	... .	.....	.....	48.00	94	—20	....	....	114	.....	.....	....	..	..	.....									
1813	44.85	51.83	48.39	48.35	87	— 2	22	44	89	195.5	169.5	57	17	2	.....	25	16.5	2	43	120	3	84	71.5	S.
1814	45.92	53.85	49.77	49.84	86	— 6	26	53	92	187	178	74	11	5	...	28.5	9	2	42	124.5	5	55	99	S.
1820	43.24	56.31	47.40	48.98	100	— 5	36	64	105	154.5	211.5	85	28	2	.....	44	10	7.5	63.5	89	12	87.5	52.5	S.
1821	42.62	54.53	47.11	48.09	93	—14	28	62	107	180.5	184.5	83	40	3	.....	33.5	8.5	6.5	58.5	82.5	21	98.5	56	W.
1822	43.85	56.00	47.69	49.18	90	—14	30	52	104	189	176	91	21	1	.....	38	15.5	5	63	107	9.5	78	49	S.
1823	42.04	53.46	46.43	47.31	94	— 6	30	55	100	198.5	166.5	64	32	3	.....	42	13	3	83	64.5	13	82	64.5	SE.
1824	42.71	54.26	46.69	47.88	89	— 3	30	60	92	187.5	178.5	82	19	1	.....	31	17	3	100.5	48.5	39	51.5	75.5	SE.
1825	44 79	56.97	49.64	50.46	98	— 6	30	54	104	209	156	56	13	4	.....	59	19	3	48	83.5	40	48	64.5	S.
1826	45.38	56.47	49.68	50.51	92	—12	36	65	104	209.5	155.5	77	21	3	33.12	46.5	13	2	60.5	84.5	34	70.5	54	S.
1827	43.67	53.85	46.87	48.13	90	—18	32	60	108	215.5	149.5	79	22	6	49.80	54.5	10	2.5	23	114	31	66	54	S.
1828	46.18	57.77	49.21	51.06	98	0	36	52	98	223	143	97	13	6	37.66	35.5	6	7	22.5	140	29.5	66	59.5	S.
1829	42.49	56.25	45.62	48.12	90	—10	37	58	100	215.5	149.5	79	20	6	38.07	29	11.5	3	35	106	26	80	74.5	S.
1830	.....	.....	.....	50.65	97	—12	....	67	109	225.5	139.5	93	25	8	41.85	30	12	2	36 5	102.5	28	50	104	NW.
1831	.....	.....	.....	49.15	94	—10	....	65	104	206.5	158.5	89	25	4	39.52	21.5	9	1	29.5	117	31.5	70.5	85	S.
1832	.....	.....	.....	48.10	91	—11	....	61	102	200.5	165.5	88	22	9	44.45	32	17	.5	34	126	17.5	52.5	86.5	S.

*It will be well again to mention that Dr. Eights' mid-day observations were at 3 P. M. and mine at 2 P. M.

TABLE XVIII.

Comparison of the results of double sets of observations.

	1826.		1827.		1828.		1829.	
	City observations.	Regents observations.	City.	Regents.	City.	Regents.	City.	Regents.
January,	27.74	28.25	17.16	17.40	29.92	30.24	22.97	23.47
February,	29.79	30.57	27.10	27.49	34.81	35.24	19.98	19.96
March,	37.75	38.60	36.39	37.47	38.58	39.61	32.57	32.92
April,	44.40	45.54	50.74	51.48	44.94	45.85	48·05	48.10
May,	66.49	67.01	59.40	59 70	60.87	61.46	64.17	64.45
June,	70.50	70.45	67.82	68.17	73.19	74.04	68.03	68.12
July,	73.11	73.66	72.74	73.29	71.36	71.11	67.28	68.57
August,	71.79	72.38	69.51	70.09	73.35	72.92	69.71	68.97
September,	64.00	64.93	61.62	62.35	62.19	62.17	57.00	57.04
October,	51.92	52.49	51.48	51.77	48.64	48.50	51.28	51.27
November,	39.74	39.88	33.87	34.19	40.34	39.77	39 52	39.19
December,	28.93	29.07	29.77	30.02	34.57	34.52	36.95	36.45
Annual mean temp.	50.51	51.07	48.13	48.62	51.06	51.36	48.12	48.20

Humboldt, in his interesting and most valuable memoir on "*Isothermal Lines* and the Distribution of Heat over the Globe*,"† when remarking on the number of daily observations best calculated to ascertain the mean temperature, says, "Experience proves that the mean temperatures of the year, obtained by *two* or *three* observations, do not differ sensibly, if the intermediate observation is sufficiently distant (four or five hours) from the observation of maximum and minimum." I was desirous of verifying the correctness of this remark by the preceding table, and have been gratified with the result, which is as follows.

TABLE XIX.

	Mean temperature, deduced from observations at 7 and 2, or 7 and 3.		Mean temperature, deduced from observations at 7, 2 and 9, or 7, 3 and 9.
1813	48·34	.....	48·35
1814	49·88	.....	49·84
1820	49·77	.....	48·98
1821	48·52	.....	48·09
1822	49·92	.....	49·18
1823	47·75	.....	47·31
1824	48·48	.....	47·88
1825	50·88	.....	50·46
1826	50·92	.....	50·51
1827	48·76	.....	48·13
1828	51·97	.....	51·06
Total, ...	545·19	.....	539·79
Annual average,	45·43	.....	44·98

The results deduceable from table XVII. may here be given.

Mean temperature of Albany, from the observations of 17 years,	49°04.	
Highest point of the thermometer,	do.	100° (in 1820.)
Lowest do	do	do —20° (in 1796.)
Greatest range,		120°

* *Isothermal.* Lines of equal heat in various parts of the globe.

† Edinburgh Philosophical Journal, vols. 3 and 4. He recommends (vol. 3, p. 18,) that in taking means in order to find the quantity of heat divided between the day and the night, we must couple the *maximum* of one day with the *minimum* of the day following. The directions of the Regents of the University would seem to be in comformity to this advice.

WEATHER, as observed for 15 years,

Fair days, 2997½.

Cloudy days, 2481½; being an annual average of nearly 200 *fair days.*

Rain. No. of days on which it fell, 1194. Annual av. 79 days.

Snow. do do do 329. do 22 do

Rain & Snow. do do do 63. do 4 do

RAIN GAGE for seven years, 284·47 inches.

Annual average, 40·64 inches.

WINDS, for 15 years.

	Total.	*Annual average.*
North,	560	37½
Northeast,	187	12½
East,	50	3½
Southeast,	742½	49½
South,	1509½	100½
Southwest,	340	22½
West,	1040	69½
Northwest,	1050	70
	5479	365

The following may be added as illustrative of the variety of the seasons.

TABLE XX.

Years.	First Thunder Storm.		First fall of Snow.	
1813	March	18	October	19
1814	April	30	November	3
1820	April	11	October	25
1821	May	29	November	19
1822*	May 1, with hail.		November	1
1823†	.....		November	18
1824	.....		October	31
1825	March	17	November	20
1826	March	20	November	22
1827	.....		November	7
1828	March	24	November	12
1829	April	19	November	11
1830	May	1	November	29
1831	March	31	November	22
1832	March	12	November	13

* On the 21st of February, 1822, there was a thunder storm in the evening.

† October 25, 1823, a fall of rain commenced early in the morning, which at 11 A. M. changed to heavy snow, and this continued until 4 P. M. There were several flashes of lightning, with severe thunder, during the snow storm.

TABLE XXI.

Years.	Coldest day.*	Degree.	Warmest day.	Degree.
1795	February 27	—10	July 12	96
1796	December 24	—20	August 28	94
1813	Jan. 27 & Feb. 3	— 2	September 13	87
1814	Jan. 4 & Feb. 5	— 6	August 11	86
1820	February 2&5	— 5	July† 9	100
1821	January 25	—14	July 31 & Aug. 15	93
1822	January 14	—14	July 1	90
1823	February 7	— 6	July 10	94
1824	February 3	— 3	June 29	89
1825	December 13	— 6	June 12	98
1826	February 1	—12	May 15	92
1827	January 21	—18	August 6	90
1828	January 24	0	August 31	98
1829	January 3	—10	May 28	90
1830	February 6	—12	July 21	97
1831	January 21	—10	June 1	94
1832	February 25	—11	June 15 & July 7	91

I add to these, as an important and necessary supplement, the periods of the opening and closing of the river in each year, so far at least as I have been enabled to obtain them. I copy them principally from an article which appeared some time since in the "*New-York Daily Advertiser.*" Those marked * are derived from authentic records, or my own observations; (some of the last years are confirmed by extracts from the diary of my friend, Jas. Stevenson, Esq.)

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* All these were of course noticed at the morning's observations, while those of the heat at the mid-day one.

† A shower followed a short time after 2, and at its conclusion the thermometer was at 80°, with a west wind. The 2?d of June in this year (1820) appears to have been very generally warm. It was 94° at Albany; at Hudson, (N. Y.) 100; at Hartford (Conn.) 98°; at Portland 94°; at Newburyport 101°, and at Quebec 98°.

TABLE XXII.

Winters.	River closed or obstructed by ice.	River open or free of ice.	No. days closed
1785—86		*March 23, 1786	
1789—90	February 3, 1790		
1790—91	December 8, 1790		
1791—92	December 8, 1791		
1792—93	Decem. 12, 1792		
1793—94	Decem. 26, 1793	*March 17, 1794	81 days.
1794—95	January 12, 1795		
1795—96	January 23, 1796		
1796—97	Novem. 28, 1796		
1797—98	Novem. 26, 1797		
1798—99	Novem. 23, 1798		
1799–1800	January 6, 1800		
1800—01	January 3, 1801		
1801—02	February 3, 1802		
1802—03	Decem. 16, 1802		
1803—04	January 12, 1804		
1804—05	Decem. 13, 1804		
1805—06	January 9, 1806	February 23, 1806	45 days.
1806—07	Decem. 11, 1806		
1807—08	January 4, 1808		
1808—09	Decem. 9, 1808		
1809—10	January 19, 1810		
1810—11	Decem. 14, 1810		
1811—12	Decem. 20, 1811		
1812—13	Decem. 21, 1812	*March 13, 1813	83 days.
†1813—14	Decem. 22, 1813		
1814—15	Decem. 10, 1814		
1815—16	Decem. 2, 1815		
‡1816—17	Decem. 18, 1816		
§1817—18	Decem. 7, 1817	March 25, 1818	108 days.
1818—19	Decem. 14, 1818	April 3, 1819	110 days.
1819—20	Decem. 13, 1819	March 25, 1820	102 days.
‖1820—21	Novem. 13, 1820	March 15, 1821	123 days.
1821—22	Decem. 13, 1821	March 15, 1822	92 days.
1822—23	Decem. 24, 1822	March 24, 1823	90 days.
¶1823—24	Decem. 16, 1823	March 3, 1824	78 days.
1824—25	January 5, 1825	March 6, 1825	60 days.
1825—26	Decem. 13, 1825	*Feb. 26, 1826	75 days.
1826—27	Decem. 24, 1826	*March 20, 1827	86 days.
**1827—28	*Novem. 25, 1827	*Feb. 8, 1828	About 50 do.
1828—29	*Decem. 23, 1828	*April 1, 1829	100 days.
1829—30	*January 11, 1830	*March 15, 1830	63 days.
††1830—31	*Decem. 23, 1830	*March 15, 1831	82 days.
1831—32	*Decem. 5, 1831	*March 25, 1832	111 days.
‡‡1832—33	*Decem. 21, 1832	*March 21, 1833	83 days.

[For Notes, see next page.]

It is interesting to inquire how far the results thus obtained accord with previous general views on the subject. These, as I have already intimated, are no where more fully or satisfactorily elucidated, than in the memoir of Humboldt. I propose, in the conclusion of this paper, to test some of his positions by the present observations. If they do not agree with his deductions, there is doubtless inaccuracy in some one or other respects, while if they on the whole correspond, a useful addition will be made to the mass of facts in this yet imperfect science.

He remarks that the Isothermal line of 50° in N. America passes near Boston, and founds this apparently in part, on observations made at Ipswich and Cambridge, (Mass.) He also illustrates his position, that there is a greater variety between the seasons in the new than in the old world, by references to the latter place; and again, he states the mean temperature of America, east of the Alleganies, at various degrees of latitude, either by deductions from "direct observations, or by interpolations between a great number of observations made in neighboring places and situated under the same meridian."* Let us group these together and then compare them with the present tables.

Places.	N. Lat.	W. Long.	Mean tem.	Mean tem. winter.	Mean tem. summer.
Boston, ...	42.30	70.59	50.00		
Ipswich, ...	42.38	. . . .	50.00		
†Cambridge, . .	42.25	71.03	50.04	34.00	70.05
America, east of the Alleganies, . .	42.30	71.10	. . . .	30.02	73.40

* Edinburgh Philosophical Journal, vol. 3, p. 257, 258, 265.

† in another part of his memoir (vol. 5, p. 33,) he gives the mean temperature of Cambridge, from two years' observations at Boston, as 50.36; winter 33.98; summer, 70.70.

† During this winter the Peripneumonia typhodes prevailed as an epidemic in Albany.

‡ It opened again Dec. 14, and closed December 21st.

§ This winter was long and intensely cold. On the 3d of March, 1818, the ice moved in a body downwards for some distance, and there remained stationary. The river was not clear until March 25th.

‖ The river closed on the 13th, opened on the 20th, and finally closed December 1. This was one of the four winters during a century, in which the Hudson between Powles'-Hook and New-York was crossed on the ice. The other three being 1740–41, 1764–65 and 1779–80.

¶ Jan. 11, 1824. The river was clear of ice and remained so for several days.

** The river opened and closed repeatedly during this winter; Dec. 21 it closed a second time. 1828, Feb. 9. Wild ducks and pigeons flew over the city.—*J. Stevenson.*

†† Opened in consequence of heavy rains, and closed again on the 10th January, 1831.

†† Opened again January 3; closed again January 11.

ALBANY.—TABLE XXIII.

Years.	Spring. Mean temp.	Summer. Mean temp.	Autumn. Mean temp.	Winter. Mean temp.
1795	49.50	71.00	50.66	28.16
1796	45.00	69.83		
1813	45.70	70.61	51.70	24.90
1814	48.59	70.71	52.83	
1820	47.74	73.58	49.56	23.70
1821	45.23	71.67	50.94	22.99
1822	48.62	71.24	53.03	23.82
1823	46.33	71.56	46.98	28.04
1824	44.88	67.87	49.87	28.69
1825	49.94	73.92	50.11	29.18
1826	49.54	71.80	51.88	24.39
1827	48.84	70.02	48.99	31.50
1828	48.13	72.63	50.39	25.84
1829	48.26	68.34	49.26	28.77
1830	51.11	70.12	53.62	25.88
1831	51.78	72.59	51.91	21.54
1832	45.62	69.65	51.31	
Annual ave.	47.93	71.00	50.81	26.24

Other observations made by our author need but a glance at the tables for their verification. Among these I may specify the following: "The increase of vernal temperature is great (from 14°4 or 16°2 in the space of a month,) and equally prolonged, wherever the division of the annual heat between the seasons is very unequal, as in the north of Europe and in the temperature of the United States." And again, "In all places, whose mean temperature is below 62°6, the revival of nature takes place in spring in that month whose mean temperature reaches 42°8 or 46°4. When a month rises to 41°9 the peach flowers.

46 8 the plum flowers.

51 8 the birch tree (Betula Alba) pushes out its leaves.*

On one point I have found a difference. Baron Humboldt, in opposition to Kirwan, and from observations deduced from numerous European tables, asserts that the mean temperature of October approaches nearer to that of the whole year than the tempera-

* Edinburgh Phil. Journal, vol. 4, p. 30, 32.

ture of April, as was asserted by Kirwan. The following result has been here obtained.

TABLE XXIV.

	Mean temp. of the year.	Mean temp. of October.	Mean temp. of April.
1795	50.00	51.50	49.50
1796	48.00	48.00	47.50
1813	48.35	49.55	49.16
1814	49.84	53.11	48.87
1820	48.98	48.42	50.85
1821	48.09	49.55	43.43
1822	49.18	51.49	46.51
1823	47.31	47.15	49.11
1824	47.88	50.26	46.76
1825	50.46	52.79	49.63
1826	50.51	51.92	44.40
1827	48.13	51.48	50.74
1828	51.06	48.64	44.94
1829	48.12	51.28	48.05
1830	50.65	52.39	56.02
1831	49.15	52.61	52.08
1832	48.10	50.71	44.93
Average, ...	49.04	50.63	48.38

I have naturally been anxious to ascertain how far the result of these observations corresponds with the formula of Dr. Brewster, and on this point have been favored with the following observations by my colleague, Professor Ten Eyck.

"Dr. Brewster's formula for finding the mean temperature of a place is (mean temp. $=86.3°$ Sin D$-3\frac{1}{2}°$,) or $86.3°$ multiplied by the sine of the distance of the place from the nearest isothermal pole,* and $3\frac{1}{2}°$ subtracted from the product. The result is the mean temperature. The mean temperature at the equator in the warmest meridian is $82.8°$, and at the pole$-3\frac{1}{2}°$.

The distance of Albany, Latitude 42° 38' 39"
Longitude 73 44 49,
from the isothermal pole calculated by Dr. Brewster's formula is 38° 34' 51", and by calculation the mean temperature will be 50.3191°.

* The nearest isothermal pole is situated in lat. 80, N. and 100 west longitude.

By the preceding observations it is 49.04 ; but it must be recollected that the results of several very intense winters enter into the elements from which it is deduced.

The temperature of wells, as observed in August and September, 1829, was 51°.

As it may be interesting, I add the results obtained in places of nearly the same latitude with Albany. The late Dr. Holyoke, of Salem, made observations in that town during a period of 33 years, (from 1786 to 1818 inclusive.)

*Latitude of Salem, 42.31 N.
Longitude of do 76.53.
Mean temperature deduced as above, 48°68.
Greatest range, 112.
Hottest, 101.
Coldest, —11.
Mean of winter, 27.502.
do spring, 46.05.
do summer, 69.84.
do autumn, 51.308.

These observations were made four times a day, at 8 A. M., at noon, at sunset, and at 10 P. M.

Professor Dewey made meteorological observations at Williamstown, (Mass.) for four years, 1816 to 1819 inclusive.
Latitude, 42.30.
Longitude, 73.00.
Mean temperature for four years, 44°73.

Height of Williamstown above the tide waters of the Hudson at Troy, 1000 feet.†
Height of Albany only 130 feet.

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* American Almanac for 1833.
† Memoirs of the American Academy of Arts and Sciences, vol. 1, pages 382, 387.

ART. II. *Observations on the Solar Eclipse of July*, 1832, *and the Longitude of Albany, in a Letter to* SIMEON DE WITT, *1st Vice President, from* STEPHEN ALEXANDER, A. M. *Corresponding Member.*

Read March 7, 1833.

Princeton, (New-Jersey,) Feb. 6, 1833.

Esteemed and respected Sir,

Presuming that they will not prove uninteresting to you, I send my observations on the Eclipse of July last, as also the Longitude of the Albany Academy as deduced from it and several previous occultations of the fixed stars.

SOLAR ECLIPSE OF JULY 27th, 1832.

Beginning, at 7h. 7m. 2s.5 A. M. (Mean Time.)
End, at 8h. 45m. 45s.5

Duration, 1h. 38m. 43s.

Although no very sensible effect upon the temperature could be expected, two thermometers were exposed to the sun's direct rays and two placed in the shade. The bulb of one of each pair was coated with a black pigment. The results were as follows:

TIME OF OBSERVATION.	No.1.	No.2.	No.3.	No.4.	No.1. about	No.2. about	No.3. about	No.4. about
Soon after the beginning,	72	92	63½	66	1-15	0	1-12	0
At 7h. 42m.	74	92	66	66	1-15	3-15	1-15	0
Soon after the greatest obscuration,	75	95	67	66	1-24	1-12	1-48	1-48
At 8h. 21½m.	76	97	67½	67½	3-13	5-13	7-52	2-13
Soon after the end, . .	82	107	71	71½	1-12	1-12	1-16	1-24
At 9h. 11m.	84	109	72½	72½				

The last four columns contain the increment of temperature per minute, between each observation and the next succeeding, as indicated by each thermometer. The figures denote fractions of a degree.

Nos. 1 and 2 were exposed to the sun, the bulb of No. 2 being coated in the manner before stated. Nos. 3 and 4 were placed in the shade—No. 4 having its bulb coated.

The sky was cloudless. The indentation produced by the moon appeared perfectly free from prominences of any kind, although their occurrence in the case of a solar eclipse is by no means uncommon.

In computing the longitude three seconds were subtracted from the observed time of the beginning, the sum of the sun and moon's semi-diameters was diminished 5″ for irradiation and inflection, and the error of the lunar tables, in latitude, deduced and applied. The following were the results :

	Longitude W. of Greenwich in Time.
From the beginning,	4h. 45m. 28s.587
From the end,	4h. 54m. 36s.525

Correction of the moon's latitude (the solar tables being supposed correct) +2″6.

The individual results of the occultation, before referred to, were as follows :

		Longitude in Time.
Immersion of	1 γ ♍	1831, June 17th, 4h. 54m. 46s.
Immersion of	γ ♉	" Aug. 29th, 4h. 55m. 7s.
Emersion of	ditto,	" Aug. 30th, 4h. 55m. 8s.
Immersion of	1 μ Ceti,	" Oct. 21st, 4h. 54m. 50s.
Immersion of	Aldebaran,	" Dec. 17th, 4h. 54m. 35s.
Emersion of	do.	" do. 4h. 54m. 12s.

The moon's semi-diameter was in each case diminished 2″ for inflection, and in computing the results of the eclipse, as well as those of the occultations, the ellipticity of the earth was assumed to be 1–309.

The mean of all the observations places the Academy in longitude 4h. 54m. 13s.03 W. of Greenwich. The observation of the *emersion of Aldebaran* was, however, considered at the time to be of somewhat doubtful accuracy. Its result, it will be observ-

ed, differs 23 seconds from that of the immersion ; if this observation be, consequently, rejected, the mean result of those remaining will be 4h. 54m. 47s.65, placing the Academy 73° 41′ 54¼″ W. of Greenwich.

Should you, Sir, judge the above results to be of sufficient importance, you will please communicate them to the Albany Institute.

I remain, Sir, with great respect,

Most truly yours,

STEPHEN ALEXANDER.

Gen. Simeon De Witt.

Art. III. Annual Address, *delivered before the Institute, April* 3, 1833, *by* Amos Dean, A. M.

GENTLEMEN OF THE INSTITUTE,

In attempting to perform the duty devolving upon me on this occasion, may I hope to experience from you a degree of indulgence in its discharge, equal with that of the kindness which I have already received in its imposition. The guarantee of that would be, to me, an ample indemnity for disappointed hope, or realised fear, for baffled expectation, or unsuccessful effort.

The history of our race has been hitherto read and regarded too much as a mere mass of particulars. The events it details have been considered more with reference to themselves merely, than as presenting the successive undivided links of one continuous chain. It is time we should profit from the lessons of the past. An experience of almost six thousand years should be able to present us with, at least, the rudiments of a system. It is time we undertook to comprehend the great volume of our history as a whole; to observe the agency of each event in the formation of that whole; and, in this manner, to seek for the elements of order amid the apparent evidences of confusion.

In the constitution of the material universe we have not failed to discover proofs of the most perfect order. From the beauties of proportion, and the harmonies of arrangement, and the mutual adaptations existing between its diversified parts, and between each part and the whole, arises the inference, that to warrant the introduction of a new principle into its operations would require a new modeling of the entire whole.

In the phenomena of intellect are exhibited evidences of the same order. The complicated machinery of mind; the nice adjustment of its faculties; the accurate balancing of its powers; the modifying influence of each upon all, and of all upon each, indicate with a clearness, setting all doubt at defiance, that the Master-mover has there left his impress.

Nor there only. In the adaptation of the material universe to the human mind; in the felicitous agency of the one in calling forth the dormant faculties of the other; in the higher harmonies of man with his material domicil; we recognize, if possible, still more distinctly, the agency of Him, who is alike traceable in the order of the material universe, and in the happy arrangement of the human mind.

But do all evidences of the existence of order rest here? It would be indeed extraordinary, if in this vast material theatre so orderly arranged; if with these actors so systematically constituted; if with these adaptations and harmonies existing between the actor and his theatre of action; the performance itself should display nor order, nor arrangement, nor plan, nor system. It cannot be so. In the great volume of human actions the Creator has also left a record of himself.

In proof of this assertion let us boldly interrogate history. Let us ask it to furnish evidences of the same profound order; of the same regular arrangement; of the same mighty plan; of the same comprehensive system; leading us irresistably to the conclusion, that the material world, that the human mind, and that human acts, all originate from the same source, because they all exist subject to the same law, the law of order.

This is the task I assume on this occasion. Its magnitude is sufficiently apparent. Let it serve then as an apology for the brevity that I shall be compelled to resort to.

I can hold in little estimation the intellect that is content to stop at the mere event, or that seeks no higher warrant for its occurrence than the immediate motive actuating its originator. Acts and events are of little consequence in themselves considered. It is only as the evidences of things not seen that they become important. They result necessarily from the spirit of the era in which they occur, and indicate its true direction. From the characteristics of its events must the predominating spirit of an era be collected. They are the true form under which its peculiarities are developed.

The history of humanity is divisible into as many distinct eras, as there have been different spirits, successively exercising a controling influence in human affairs. By the term *spirit*, I mean the *prevailing principle* discernible in the whole course of the events of any given period, and to which, as an efficient cause, those events are referable. Each era has not only had its own spirit, but also its own distinct theatre, or portion of this world's surface to which its operations have been chiefly confined.

The great drama of history opens in Asia. There we see exhibited the infancy of man, and there that infancy still continues. All the elements that constitute human nature are there enveloped in each other, or so intimately blended together as to preclude the action of each without rendering necessary that of all. By the term *elements*, I here mean those *primary principles* of our nature that severally manifest themselves in *industry*, in *government*, in *arts*, in *religion*, and in *philosophy*. Of these elements, that of industry is founded on the idea of the useful, government on that of the just, the arts on that of the beautiful, religion on that of the holy or divine, and philosophy on that of the true in itself. It is only in the separate, distinct, and uncombined action of each element, that we can expect to witness the gradual development of its intrinsic perfection. To accomplish this separation and developement of human elements requires the exercise of every active principle of our nature.

The envelopement, or intimate blending of these elements, is attested by all the important phenomena that have been observed in Asia. In speaking of Asia generally, I must be understood as not intending to include those regions immediately bordering upon the Caspian, Black, and Mediterranean seas, which in their physical character are more strictly European than Asiatic. The specimens of the arts exhibited in Asia are so indefinite in outline, so general in character, so deficient in just proportion, as to indicate a still indissoluble union between the arts and their associate elements. The dictates of the religion, the precepts of the morality, the de-

ductions of the philosophy of the east, are all in strict unison with each other, and exclude the idea that there is between them any line of separation.

This state of envelopement, or intimate union, seems, therefore, to be the condition under which the existence of man is given in Asia. This condition has stamped one peculiar feature upon this primitive era in our history—and that is mental inaction, profound repose, a destitution of well directed physical effort. To these the local peculiarities of Asia strongly conduce. Its centre is one immense continuous plateau of elevated land. The intense heat at the south divests the human frame of its energy, and the mental and moral fabric, of its power. The events brought down to us by history have mostly transpired within the temperate zones. In Asia there is, strictly speaking, no actual temperate zone. The regions of fire and frost there border upon each other. At the foot of the Himaleh you are scorched by a torrid sun. Ascend their steep acclivities, and you stand on the immense plateau of central Asia, directly within the sphere and influence of the northern "polar sanctuaries."

Many of the institutions of Asia, particularly of the southern part, come in aid of those local peculiarities. The institution of the castes of India effectually destroys all motive for exertion.

The religion and morality of India both lead to the same general inaction. Here, as elsewhere, in these departments as in every other, we find every thing harmonizing with every thing. The same spirit pervading every institution, and breathing its influences, for good or ill, into every department. What is its religion? A deformed theology, absorbing every thing into itself; allowing man no part to perform but that of a mere machine, and leaving it indifferent, in the great system of things, whether even that part be or be not performed by him. Religion is the predominating element of the east. What is its morality? That also inspires repose. It teaches man if action be necessary, to act as though he acted not; to act with a profound indiffer-

ence to all its results. That whether he acted or not, the eternal principle that creates, and modifies, and renews, and sustains all things, would be still the same.

Under these combined influences man in Asia, has ever remained the same. We have seen him exhibiting no striking evidences of mental or moral advancement, bequeathing us no important discoveries in art or science; handing down to us no trophies of his victories over the elements of nature. Exclusive of what foreign agency has effected, when have we ever witnessed an alteration in the manners, customs, laws, or institutions of India, China, or central Asia? The sun that gladdens this day has risen upon the same, with few or no modifications, that were dawned upon by the sun of Zoroaster. Centuries have there come and gone, and left no impress. Let foreign influence cease to operate, and they never will leave any. As soon may we expect to see the Egyptian mummy bursting the cearments of its sepulchre, and displaying anew the energies of a life long lost, as to see the Asiatic competing with the European and American in the actings and doings of this world.

Industry, government, the arts, religion, philosophy, there form one mingled mass. No attempt at separation. No effort at developement. We see every where exhibited the same dull, dead uniformity; the same Sahara of the mental and moral world.

It is true, we have witnessed physical movements of man in Asia. On that wide waste of desolation, the central plateau, have roamed the Scythian of the ancient; and the Tartar of the modern world. We have also seen mankind there move in masses. Individuals, or tribes, accidentally collected together, or united through the influence of some commanding genius, that has casually appeared among them, have, at different times, descended from that elevation, and invaded the domains of civilization. The immense bodies of men that, in the fourth and fifth centuries, moved from that nursery of nations, that birth place of European ancestry, found nothing sufficient to stop their onward progress until they reached the Atlantic ocean on the shores of Portugal.

We have now contemplated one great exhibition of human nature. We have seen it present one strong peculiar characteristic, that of inaction, arising from the envelopement, or intimate commingling of all its elements. Were those elements always to remain enveloped? Was that nature ever to remain inactive? All existence is granted subject to one condition, to the operation of one uniform law, the law of progression. The man must walk forth from the boy, the civilized from the savage. Happily our race can claim no exemption from this condition, or from the operation of this law. To perform it, therefore, it was necessary that a movement should be made, that a new era should open, a new spirit predominate. It is here proper to advert to the manner and direction in which that progression is accomplished. The man advances by a successive separation and developement of his powers, humanity by a successive separation and developement of her elements. We have seen in Asia all these elements, industry, government, the arts, religion and philosophy enveloped within each other, or intimately mingled together. It is the successive separation of each element from all the others, and the full systematic developement of each, or its utmost possible extension into all its particular and general applications, that constitutes the progressive principle of our race.

This principle has ever been manifested in one direction only. It is a fact rather curious, that one great movement of the atmosphere, that all sustaining principle of life, has ever been from east to west. In the same direction are the mighty movements of that majestic ocean, "that has once been the cradle of our globe, and may yet be its grave." The mental and moral movements of man, the progressive principle of humanity, have been in the same direction.

In the opening of a new era, to be influenced by a new spirit, we are to view man under a different aspect. We are to proceed from inertia to action; from where man was nothing to where he is every thing; from despotism to democracy; from union to separation; from envelopement to developement; from Asia to Greece. This new era required a

new theatre of action. It found one in the mildness of a Grecian sky; in the balm of a Grecian atmosphere; in the variegated beauties of a Grecian landscape; in the diversified qualities of a Grecian soil. The mountain, the stream, the bay, the harbour, unproductive Attica, and fruitful Messenia, all furnished motives for action. Man did act, and thus became acquainted with his own powers, and the extraordinary qualities with which his God had endowed him. Here, for the first time, the important secret was discovered, that in the inventory of the universe, man forms an item of value. The high estimation in which he here held himself is inferable from the fact, that he has invested his very gods with human attributes. He has transferred his own nature to his own heavens, and admired, and loved, and feared its display in the wisdom of his Pallas, in the loves of his Venus, in the valor of his Mars, in the thunders of his Jupiter. From the volitions, powers, and energies, he discovered in himself, he inferred that he was something more than a mere machine in the operations he effected. In the relations existing between him and external nature, he discovered a mutuality; that he was as essential to the world as the world was to him. The conviction of his free agency resulted from his feelings and his reasoning. But if free to act or forbear, he must be accountable for his choice, otherwise there could be no moral right or wrong. This principle of accountability, resulting from the conviction of his free agency, is distinctly traceable in all the great outlines of Grecian polity. When an important principle is first discovered, it is not surprising that its practical operation should be tested by a great variety of applications. We accordingly recognize this as the fundamental principle, entering essentially into the very being of those little democracies. It was the key-stone of their governmental arch. Without it, the entire fabric was a ruin. With it, an exhibition of order, beauty, and harmony. Accountability direct, immediate, and unconditional, was the tenure by which every office was held, the condition attached to every official act. Through the medium of the ostracism, even exalted worth itself was compelled to account for its

very worthiness. It was through the instrumentality of this all-important principle that man here sought the high attainment of self-government. The adoption of this kind of government led to important results in a national point of view. It clothed the state with new powers, invested it with new attributes, threw over it the moral qualities of a person, and thus rendered it a fit subject of the law of nations. Its will was the blended wills of all its members; its acts, their acts, modified by each other. It bore nearly the same kind of relation to its members, that life does to the organs through which it operates, or that the entire mind does to the faculties that compose it.

The spirit actuating the movements of the Greek and Roman era was the same. In the government of Rome we recognize indeed a new peculiarity, the aristocracy. To that, perhaps, is owing the greater permanence of its institutions.

One strong feature in the Greek and Roman character was an unconquerable attachment to country. It was the source of pleasure, the centre of sympathy. Hence resulted what may be deemed the true spirit of the Greek and Roman era, national enterprise and national glory. In Greece and Rome human elements strongly tended to separation and developement. Industry, government, arts, religion, and philosophy no longer exist, as they did in Asia, one commingled mass. The arts and philosophy here achieve their enfranchisement. The productions of the former exhibit definiteness, and precision, and beauty of proportion. The Grecian model was worthy of the Grecian master. The trophies of the Grecian arts have descended to us in the glowing canvass of her Apelles, in the all but breathing marble of her Phidias.

The enfranchisement of philosophy was still more important. The very point of separation is the centre of a deep feeling, of an intense interest. Why? That point was sealed with the blood of a Socrates. In him philosophy first awoke to a knowledge and comprehension of herself. She afterwards investigated earth and its productions in the researches of her Aristotle. She ascended to the source of things in the splendid idealism of her Plato.

The remaining elements, industry, government, and religion, were still intimately blended together. A successive separation was necessary for the purpose of allowing each an opportunity of being developed, or carried out into all its possible applications. Of these yet enveloped elements, that of government, or the state, was predominant. As religion was the central element of the east, so was government that of the Greek and Roman movement. Around this, as a nucleus, gathered all the others. To strengthen the patriotic love of country, industry lent its application, religion her inspiration, philosophy her deductions, and the arts their living canvas and chisseled monument.

The Greek formed a part of his state. Its acts were, therefore, to some extent, his acts. To him that state was the world. It had been hallowed by the achievements of his forefathers. To it belonged the dawn of his infancy, the bloom of his youth, the vigor of his manhood, the decay of his age. Had he affections? that was their centre. Had he powers of action? that furnished motives for their exercise. It embodied all that was beautiful, all that was interesting, all that was lovely, all that was worth living for, all that was worth dying for. Beneath him was the Grecian soil; around him Grecian monuments; above him the abodes of Grecian gods. The Spartan cheerfully consented to the division of his lands among his countrymen; to use iron as the medium in exchanging his commodities; to lay aside all personal distinction at the public meals; because his own loved Sparta required the sacrifice. The Athenian appealed to the strength of his nation's ties, of his nation's spirit, when he resigned his cherished Athens to the mercy of a Persian foe. To preserve his nation, he abandoned the monuments of his art; the sepulchers of his sires; the shrines of his gods.

Individual worth during this era is estimated from the extent of individual sacrifice. The nation was the actor. The wave of Salamis; the straits of Thermopylae; the plain of Marathon; the field of Cannae; Carthage in ashes; a de-

molished empire, a subjugated world, attest the energy of its action. The existence of the individual is here merged in that of his nation. It is that, that inscribes its achievements in living lines on this page of the history of our race, investing this era with a nationality, rather than an individuality, of character; rendering it resplendent from the display of national glory; imposing from the exhibition of national power.

In central and western Europe we are to find that portion of our world's surface devoted to a new era, characterized by the movement of a new spirit. In the preceding era we had seen the arts and philosophy separated from the other elements, and, to a very considerable extent, developed by the Greek and Roman spirit. We had seen industry, government, and religion, still bound together by the ties of a strong and almost indissoluble union. In the era to which we have now arrived, we are to witness the efforts of industry in effecting its separation from the remaining primary elements, and its consequent developement, leaving only government and religion in a state of combination. This effort of industry brings to light the powers and energies of man as an individual, and from their freedom and vigor in action arises the distinctive spirit of this era. This truth is deeply engraven on every page of modern European history. It is told in the insubordination of its earlier periods; in the anarchy of the middle ages; in the necessity that originated the feudal system; in the strong effort, finally successful, by which its bonds were sundered, and vassalage thrown off; in the curious institution of chivalry; and in that singular fanaticism that prompted the monk to abandon the solitude of his cloister, the peasant the homely delights of his cottage, and the prince the splendor of his palace, to wrest the Holy Land from the dominion of infidels. True, this spirit has been both warlike and peaceful. At one time it has appealed to the sword as the sovereign arbiter of individual right, at another pursued the even tenor of its way under the quiet sanction of law. It was, nevertheless, the same spirit still. Its

achievements in all the departments of industry, as well as in philosophy and the arts, are numerous and important. The inventions, the discoveries of modern times, all stand its debtors. It has pervaded space; sought an acquaintance with other orbs; followed the trackless course of the comet in its wanderings; and brought back intelligence, almost from the very out-posts of creation. In the sciences that instruct, in the arts that refine, it is conspicuous. It has demanded of the material world the elements that compose it; the manner of their combination; the mode of their action. It has sought a familiar acquaintance with the laws of life; the subtleties of organization; the main facts of existence. It has penetrated the deepest recesses of mind, investigated its powers, classified its faculties, and explained their modes of operation. It has added a new world to the old, and fearlessly explored every accessible part of both. It has been active in agricultural pursuits, in the mechanic arts and inventions, in the direction of human industry, into every possible available channel. It has instituted commercial relations, and connected together the human family by the mutual ties of a common intercourse. It has acquired a mastery over physical nature, and compelled the very elements to labor for its benefit. It has ascended to the source of things; enquired into the modifications and reasons of existence, and investigated God's moral government of the world.

In the effort of industry to enfranchise itself, and in the individual energy so strongly marking this era, we recognize the key enabling us to explain some otherwise anomalous appearances in the governments of modern Europe. Government here was still involved with religion, and was, therefore, to a greater or less extent, modified by it. It acquired for itself distinct characteristics. It became an independent science, possessing its own rules, its own system of tactics. That singular personage, the state, exchanged the moral for the political mantle. Governments were sustained, not upon the principle of accountability to their constituents, but by virtue of the system of checks and balances established ex-

ternally between themselves, and internally between the component parts of each individual government. They might rather be said to protect than be protected, to uphold than be upheld. This singularity in the constitution of modern European governments, originated a new principle of action. This principle has been developed in the strong and ceaseless efforts of those governments accurately to maintain the balance of power. It arose from the anxiety of government to perpetuate itself; to foster and protect its own interests. It was a refinement in governmental reasoning. It was the "logic of empire." The consequences resulting from the actual developement of this principle have been all important in European politics. But I must here stop at immediate results, without attempting to push them into their far reaching consequences.

It is a fact worth adverting to, that the very despotic tendency of modern European governments, has resulted from the prevalent spirit of this era. In the earlier periods of their existence, the spirit of liberty and equality had been infused into these governments. Of this, the diets of Germany, the cortes of Spain, the parliament of England, and the states-general of France, are so many attesting witnesses. They have descended to us as the relics of that period. On the first page of modern European history, therefore, individual genius predominates. It was left free to obey its own impulses. That freedom, with some qualification, it has ever since enjoyed, both under the common law of England, and the civil law of the continent. Its prominent objects were the acquisition of knowledge, and the accumulation of wealth, or creation of value out of the inert things of nature. For the prevalence of an individual, rather than a national spirit, in this era there exists a reason.

Human affections must centre in something. When confined, they even attach themselves to the very barrier that confines them. Witness the love of the monk for his cloister. He loves it, because it excludes him from loving any thing else. The law which controls the action of these af-

fections, is not less clear, than the necessity of their acting. They exclude all interference with the objects of their selection. Over those objects they claim to exercise an undivided empire. The governments of modern Europe, with few or no exceptions, became established over territories of large extent, and embracing a numerous population. Government was, therefore, the common property of too great a number, to concentrate in itself the affections of individuals. Hence that affection attached itself to other objects, and accomplished its purposes in the advancement of the individual, through the medium, not of the state, but of the acquisition of knowledge, and the accumulation of wealth. Two important results have followed, the one a national, the other an individual. From the engrossing character of individual pursuits, the first result was, that governments were left to take care of themselves. They did take good care of themselves. Until recently they have possessed a decidely despotic tendency.

The other result is told in the fact of individual advancement. The science of political economy originated from the activity of the individual spirit of this era—That science was unknown to the Greeks and Romans. They never dreamed of dividing themselves into producing, distributing, and consuming classes. It was left to this era to develope the individual spirit in all the various departments of industry. To facilitate the operations of that spirit, the numerous and diversified objects of individual pursuit have been subdivided into their distinct and appropriate classes. The division of labor has been regarded as the true barometer, indicating, with unerring certainty, the degree towards perfection, to which every social system has advanced. This division has been refined, and refined, until the very pin that connects our garments has passed through eighteen distinct operations, requiring the agency of eighteen different persons, before a complete finish is given to it. This extreme division of labor has resulted in affording every person employment; in pre-

senting to every one a choice of employment; in extending the comforts and conveniencies of life to the greatest possible number; in producing a mutual intercourse between man and man; in rendering all the parts of society reciprocally dependant on each other, thus consolidating the whole by the strongest of earthly bonds—the bond of interest.

But notwithstanding the triumphs of industry during this era; notwithstanding the proud trophies it has handed down to us as the fruits of its herculean efforts, it had not yet achieved its complete enfranchisement from its previously enveloped condition. Its union with government was still too clearly perceptible in the adoption of restrictive systems, by most of the European powers; thus limiting its beneficial results, by restraining its freedom of action. Industry can only find its best possible distribution, and its greatest quantity of encouragement, when all the markets of the world are freely opened to its products.

Humanity during this, and the previous era, had attained much, but not all. She had not yet reached her acme. Her highest point of attainment yet laid in another hemisphere. We had seen a successive separation, and gradual developement, of human elements. The arts, and philosophy, and industry, except one remaining point of union, had successively achieved their enfranchisement, and inscribed, in enduring characters, on the historic page the results of their progressive developement. We were yet to see industry completely disenthralled. We were yet to see the only remaining separation—that of religion from government. We had seen a lifeless inertia characterising the first era of our history; a spirit of national movement pervading the second; and individual enterprise and activity, restrained however by governmental interference, enlivening the third. We were yet to see carried more extensively into practical operation, the important doctrine, that this world was made for individuals, not for nations. We were yet to see, at least, the disposition to acknowledge the broad truth, that all the possible develope-

ments of human nature in industry, in government, in the arts, in religion, and in philosophy, are far better made in accordance with the laws enacted by its author, than under those imposed by governmental or any other agency. Based upon the recognition of this truth, we were yet to see the individual man standing upon this world's great theatre, an actor by himself; depending upon his own energies; relying upon his own resources; and wholly divested of the adventitious aid of government. We were to see him shaping his course alone on the great ocean of life; with the universal principles of human action for his chart; his own strong judgment for his pilot; his polar star the heaven of the happy.

A new portion of our earth was required for this last separation, and for the further progressive developement of human elements. In finding it, humanity, to be consistent with her former movements, must travel westward. She did so. The Atlantic wave interposed but a feeble barrier; the then unbroken forests of our own dear land but a momentary obstacle. It requires an energy strong indeed, to stop or stay the mighty march of man on the broad surface of this globe.

America presents a field fitted to call forth the highest possible exertion. It is a goodly portion of a goodly world. Nature here blends the sublime with the beautiful; and in her happy disposition of the mountain and the plain; of the river and the lake; of the bay and the harbor; in her diversities of climate; her varieties of soil; her numerous and dissimilar productions; in her beauties of prospect; her sublimity of design; her felicity of execution, she seems to have united, in one grand result, the perfection of all her previous models. It was never intended that *man only* should dwindle here. His first act in the assumption of a national character, exhibited the noblest specimen of moral sublimity ever yet presented to the world. The American revolution was the offspring of no momentary ebullition. It proceeded less from physical, than from moral oppression. It was the firm,

calm, unalterable resolve of unprejudiced reason, to peril even life itself upon a mere issue of right.

The government established upon its termination varied from any ever before attempted. It combined, in almost equal proportions, federal and national principles. It united the distinctive characteristics of monarchy, aristocracy and democracy in harmonious proportions. It amalgamated the principle of accountability, the basis of the Greek and Roman commonwealths, with the system of checks and balances established in modern Europe. It admirably tended to unite the Greek and Roman love of country with the European love of self. In selecting the perfections of all previous models, and combining them together in beautiful proportions, man only acted in accordance with the lessons already taught him by nature in the physical formation of his happy country; lessons which he could read written in legible characters upon the summit of every mountain; in the bosom of every valley; on the shore of every lake; in the course of every stream.

We are here called upon to witness the separation of the last elements that still remained in a state of combination. Government and religion had continued indissolubly bound together during all the three previous eras. Neither of them had improved from the alliance. Here was sundered the bond of their union. Government was called upon to account to man; man only recognized his accountability to his God. The last lingering tie that connects industry with government is also about being sundered in the rejection of the restrictive system.

Well might humanity hold a jubilee upon the final separation of her elements. Well might she pause upon this proud pinacle of her attainment, this elevated Himaleh of her world, and examine the successive steps of her progress hither. The world had been the theatre of her action; time the chronicler of her acts; nations and individuals her actors. She had travelled over the fallen column; the mouldering

monument, the sepulchral city, the ruined state, the demolished kingdom, the dismembered empire. At her bidding, the nation had appeared upon her theatre; performed its part in developing the grand plot in her drama, and retired behind the scene. It disappeared when it had nothing more to fulfil; when its mission was accomplished; when the condition was complied with under which its existence had been permitted. Every important step in her advancement had required a sacrifice. Greece and Rome had retired to give place to the modern European movement. All had been losers except herself. Her progress had been onward still, whether she encountered society or solitude, the city's hum or the empire's grave.

But humanity stops not at the ultimate separation of her elements. Those elements when separated, are each to be developed, and in that developement to exhaust her entire capacity.

Industry, relieved from governmental visitation in the shape of discriminating duties, is to be carried out into all its possible varieties of application. Its empire is established over the useful; its achievements, the creation of value out of things in themselves valueless; its instruments, human hands and the complicated machinery that has been devised to aid them in their efforts; its object, human happiness in the supply it furnishes to human wants.

Government is to be a mere moral engine, an instrument to enforce public opinion. Like the great organ of digestion in the healthy animal system, it is to feel without being felt, to act without being perceived. That government is to be the most perfect, that allows man the utmost possible freedom in his industry, in his arts, in his religion, in his philosophy.

The arts are to reflect the forms of nature moulded and embellished by the human mind. They are to add beauty to the beautiful, sublimity to the sublime. They are to collect from all forms their peculiar beauties; to recombine them in harmonious proportions; and to exhibit in one powerful view, a strength in design; a felicity in execution; a perfection

in model; attainable *only* when the forms of nature are cast in the mould of mind.

Religion is to be the pure aspiration sent forth from man to his Maker. It is the foundation of his hope, the soul of his wish, the spirit of his desire. It is the point of union between this world and a better; the golden cord, the firm bond, the indissoluble tie, connecting humanity with her Author.

Philosophy, or the recognition of the true in itself, is to be the mirror reflecting all the other attainments of humanity. Her province is to investigate and develope the principle of things. In industry she is the essence of its application; in government, the spirit of its action; in the arts, beauty of proportion; in religion, the soul of its inspiration. She is the true expositor of all elemental modifications; of all the principles of action; of all the modes of existence.

Our own favored land was to be the theatre of these elemental developements. In them were to be expended the energies of humanity, when she no longer required their aid in effecting the separation of her elements. The true spirit of this era, therefore, is the spirit of developement. The existence of man is here given subject to one condition—that of directing all his energies to the developement of one or more of these great elements of humanity. The same original diversity in talent and disposition that leads to the division of labor in all the various departments of the element of industry, leads to the division of human energies in carrying out, at the same time, to their utmost possible extent of practical detail, all the other elements; their developement, therefore, must not only be progressive, but simultaneous.

But when these elements are pushed to their ultimate extent of developement, when humanity has reached her zenith, is she to rest satisfied with her highest attainments here? No. The new world must re-act on the old. The same spirit that here characterizes our free institutions; that unfolds all our individual and national movements, must cross the Atlantic, and, in Europe, the old world's great field of action, pervade

with its benign influence, every kingdom, and state, and city, and hamlet, and human habitation. That spirit has already gone forth. The fires of revolution that have been kindled in France, in Spain, in Italy, in Greece, that even yet linger amid the still smouldering ashes of Poland, attest the depth and energy of its operations. The conventions of crowned heads, that have, at different times, been held at Vienna, at Verona, at Laybach, attest the same fact. The direct tendencies of things in that interesting portion of our globe cannot be mistaken. Institutions that are recommended solely by their antiquity; that are whitened by the frosts of centuries; that have owed their origin and continuance thus far to a different spirit from that which now predominates, are fast crumbling away beneath the influence of public opinion. We have quite recently seen a crown going abroad in search of a head to wear it; and even when found, the natural affinity between head and shoulders was by no means strengthened by the golden incumbrance. Yes, the old world is hereafter to receive its main impulses from the new. From that world we have received much, to it we are to communicate more. In the sole department of discovery, we might now almost claim to hold its people our debtors. While we cheerfully accord to them all the commendation they so justly deserve for their numerous and splendid discoveries in the elements of industry, of government, of the arts, of religion, and of philosophy; they, in return, will thank our Franklin that the thunderbolt falls harmless from their dwellings, and bless our Fulton that the steam-boat almost annihilates time and distance on their rivers. At this very period, one of the governing principles in all their material movements, is a direct reference to the state and condition of things on this side the Atlantic.

The successful developement, so happily commenced, of all the separated elements of humanity in the new world, has appealed to similar elements in the old. That appeal has met with a response fatal to kingly claims. Government is there endeavoring to mould itself after our model. Let us

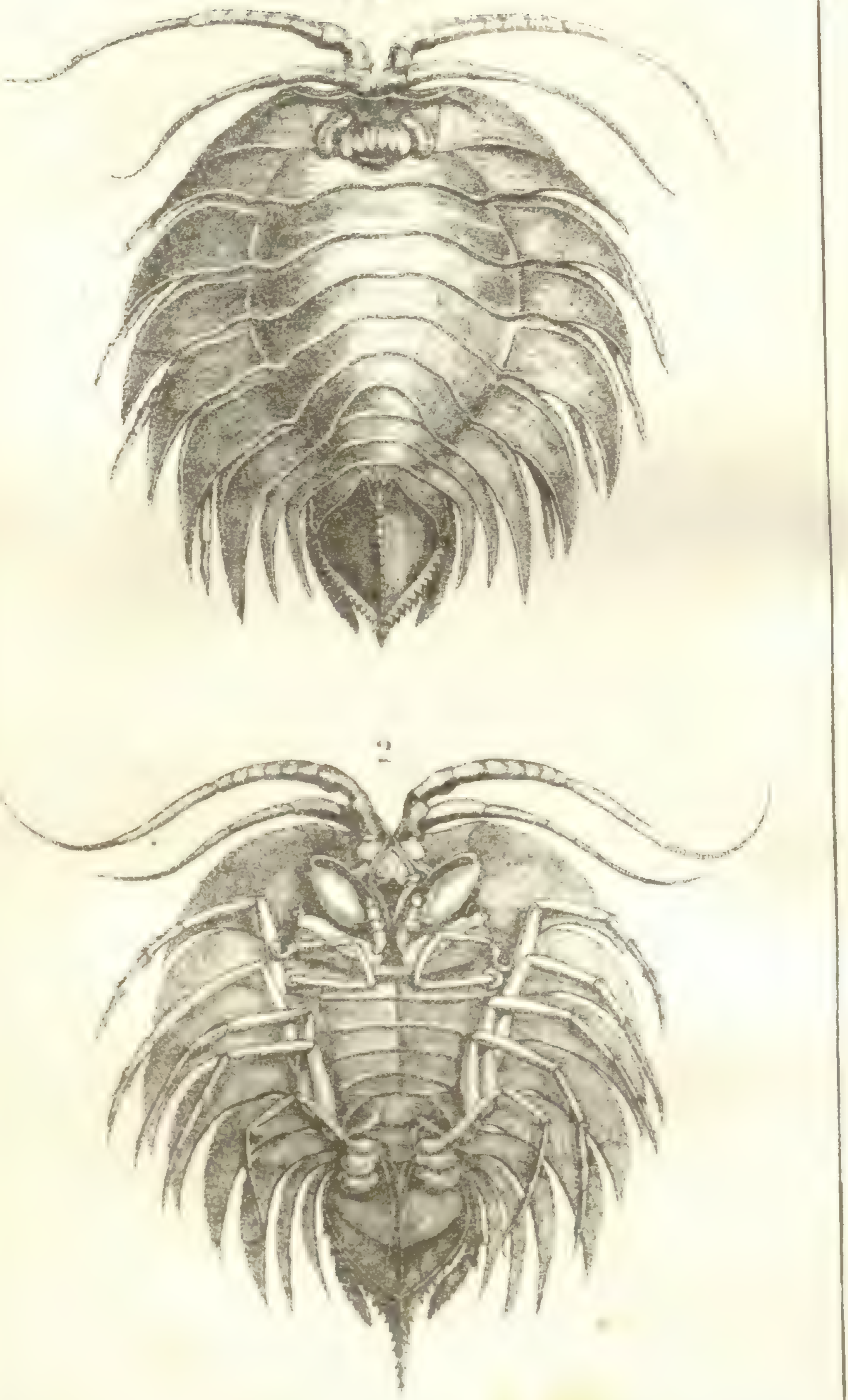
beware then of "*breaking the Pattern.*" The other elements, industry, the arts, religion, and philosophy, are striving to attain a state of complete separation and independent developement.

The re-action, by which the new world communicates its impulses to the old, is of a moral, not a physical nature. Physical force has almost performed its full errand upon earth. The commercial relations that have already arisen, and are yet to arise, upon the entire separation of industry from the other elements, consequent upon the rejection of all restrictive systems; the ties that result, necessarily, from a common intercourse; the friendly relations growing out of a constant exchange of commodities; the firm conviction that the continuance of that exchange between each, is essential to the comfort, convenience and happiness of all, will effectually prevent every interruption from belligerent causes.

The time is yet to come, when Europe and America, originally marked out as the great spheres of this world's action, are to bow to the influence of a moral sceptre; when that influence will be alone sufficient to insure to each separated element, that freedom which is essential to its complete developement; when the appeal of the injured will be made to man's moral nature; and when the deep felt conviction of another's wrong, will be more effectual in its redress, than a million of bayonets. This moral government, coupled with the full and complete developement of every human element, is the highest possible attainment of humanity; it is the last series of an hitherto constantly increasing progression; it is the near approximation of humanity to Deity; it is that proud point in this world's history, from which man can address his God and say—*We now realize the promise of thy coming.*

Plate I

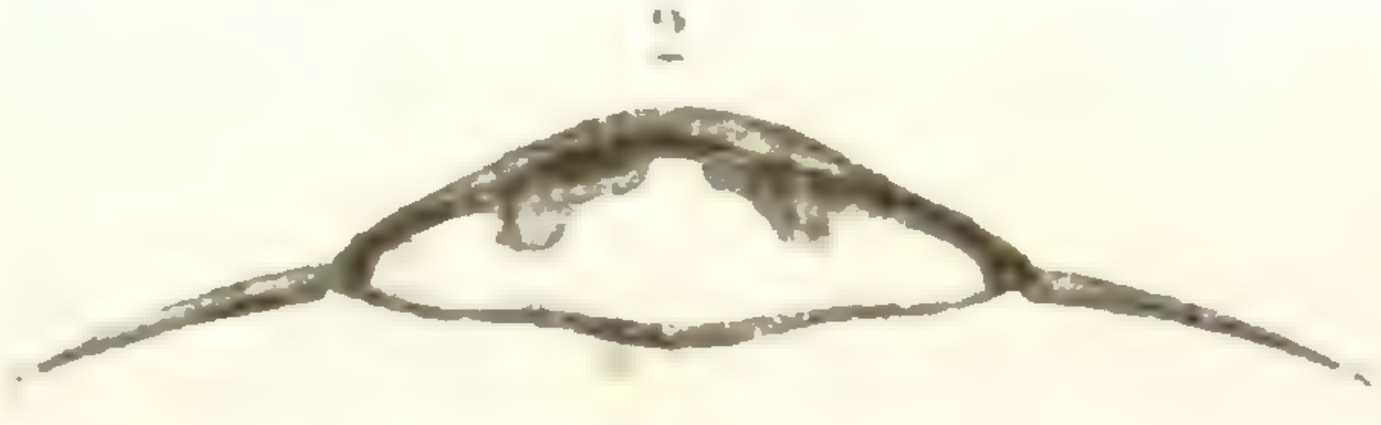
Fig. 1



BRONGNIARTIA TRILOBITOIDES.

Plate II

Fig. 1



ART. IV. *Description of a new Crustaceous Animal found on the Shores of the* SOUTH SHETLAND *Islands, with Remarks on their Natural History. By* JAMES EIGHTS, *Naturalist to the Exploring Expedition of* 1830, *and Corresponding Member of the Albany Institute.*

Communicated July 10, 1833.

CRUSTACEA.

MALACOSTRACA.

BRONGNIARTIA.

Animal broad-oval, much depressed, trilobate, lobes formed by a slightly impressed sulcus; divided from the head downwards into eight articulations, and a terminal cordiform tail: *teguments* solid and calcareous. *Eyes* two, superior, sessile and immoveable. *Antennæ* four, on a line with the margin of the shell. *Mouth* inferior, composed of a labrum, two mandibles bearing palpi, two pair of maxillæ, tongue, and a labium formed of the first foot-jaws. *Feet* fourteen, anterior four with a dilated hand, and an incurved moveable finger, remaining ten unguiculate. *Branchiæ* situated under the post-abdomen in pairs. *Tail* with foliaceous fin-like appendages on its lateral edge, inferiorly it supports four pairs of diaphanous laminæ.

B. TRILOBITOIDES.

Head approaching the segment of a circle, descending from the vertex to its anterior portion, and laterally to the edge of the margin, which is slightly serrate; anterior extremity terminated by a broad sinus, having a narrow, raised and reflected rim, furcate at each extremity: posterior edge gently elevated, sinuous, and corresponding to the articulation of the abdomen. *Eyes* elevated and prominent: cornea oblong, lunulate, reticulate, composed of an infinite number of facets, distinctly visible to the naked eye: colour blue, the superior surface covered by an irregular calcareous incrustation: from the posterior and external angle of the eye extends a suture forward and outward, dividing the front and anterior portion of the head from its lateral expansion; at the origin of the suture commences a transverse furrow, overshadowed by a

narrow reflected rim, which gradually becomes obliterated at the outward margin, giving to the posterior portion of the head somewhat the appearance of a distinct segment: a second narrow rim commences near the termination of the suture, extending backwards until it almost bisects the transverse one near the margin. The *Front* between the eyes is raised to a line with them, assuming in appearance somewhat the figure of a corona in high relief; posterior to it is an elevated angle bearing a small tubercle of a dark colour, resembling an ocellus; between the anterior angles of the eyes is also a reflected sinuous rim, rising to the same height. *Antennæ* four, inserted one above the other by a tri-articulated peduncle into the sinus of the anterior portion of the head, contiguous at the base, setaceous, a three-jointed clavola with a terminal pluri-articulated stem, the inferior projects forward and rises to an equal height, so that the four antennæ appear as if situated on the same line: superiorly, the segments are longitudinally grooved, inferiorly crossed, the shortest by three, the second six, and the external one by five ciliate elevations; superior one two thirds, and inferior one half, the length of the animal. *Labrum* attached to the nasi anteriorly, triangulate, slightly punctate, with two central depressions. The body of the *Mandibulæ* are somewhat trapezate, with an angular dental process, armed, the one on the left with two corneous teeth, placed one within the other, that on the right contains but one, they are convex externally and internally concave, with a small foramen at their base. A pediform three-jointed palpi is inserted into the base of the mandible, the first segment about equal in length to its body, lies in a deep groove on its anterior margin, the middle one corresponds in size, terminal one half its length, subovate, dilated and compressed, with a ciliate inferior edge. *Maxillæ*, two pair, inserted at the side of the mentum; superior one simple, apex armed with six rigid spines, arranged in a triple series: inferior, compound, the upper lobe covering the lower externally, and is cleft almost to its first articulation, giving to the maxillæ the appearance of being three-lobed: the apex of each is furnished with flexile spines. *Tongue* linguiform, with an acute apex, cartilaginous, short and retractile. The appendages corresponding to the first foot-jaws approximate closely to a true lip, each being furnished with a palpus, they rise up to the mandibles, meeting each other at a line

in the centre, so as to close effectually the lower portion of the mouth ; they are somewhat rhomboidal in form, and divided into four subequal portions by both a longitudinal and transverse articulation : the palpus is situated superiorly near its inner margin and is composed of a small peduncle supporting a sub-triangulate, dilated segment, the anterior edge of which is fringed with cilia, and a terminal subovate one containing a row of hairs on its extreme edge : when these two lips meet in the centre the parts are osseous and triangular ; the apex is armed with a small rigid tooth. The first pair of feet corresponding to the second foot-jaws, are attached to the head a short distance from the lower lip, laterally ; they are directed forward and laid on the mouth in such a manner as if constituting one of the organs of manducation, six-jointed : the second, third and fourth nearly equal, short and irregular, seeming to form a kind of wrist for supporting a rather large, subovoid, dilated hand, with a terminal incurved finger reflected on its inner ciliate edge. *Abdomen* with five transverse articulations, somewhat arcuated backwards, their posterior margin is slightly elevated so as to suffer the anterior edge of the following ones to pass under them ; the three first segments have their lateral portions divided at the sulcus by a deeply impressed line, or suture, which may be disunited by macerating the parts in water, otherwise they are immovable ; the remaining two are entire : the lateral parts are falcate and separated from each other by an incisure extending to the longitudinal sulcus, near which, both on their anterior and posterior edges, is situated a small tooth-like process ; a narrow elevated rim runs along the anterior margin until it becomes obsolete near the external slightly serrated edge. The second pair of feet corresponding to the third foot-jaws, are attached to the first segment after the head, and also seem to assist in the process of manducation ; they are more slender than any of the other feet, the first joint is longest, the penultimate one slightly dilated, forming a hand with an incurved moveable finger. The four remaining segments are each furnished with a pair of six articulated coriaceous feet, resembling each other both in size and appearance, being largest at the base, and gradually attenuated to the slightly curved terminal nail ; the first segment is much compressed, the succeeding ones tubular and armed at the apex, both forward and behind, with a number of small moveable spines ; on their anterior edge

are one, two or more small processes armed in like manner. The sexual organs are double, and situated near the origin of the posterior pair of the last mentioned feet. The *Post-Abdomen* is divided into three articulations, and a terminal cordiform appendage constituting a tail proper. The anterior segment has no lateral elongation, in place thereof its extremities are produced inferiorly, giving insertion to the posterior pair of true feet; these feet differ only from the preceding ones, in being rather smaller and having the terminal nail more curved. The two last segments are somewhat similar to those of the abdomen, though inferior in size. The three segments have on their under sides each a pair of pediform appendages, composed of a single compressed joint, to which are attached one about midway, the other terminal, two subovate vesicular bursæ, fringed with branchial fibres: the inferior ones of the middle pair have inserted along their inner edge a flexile setaceous style, extending backwards about twice the length of the whole appendage. *Tail* cordiform: a raised and reflected rim terminating in an acute spine near the outward margin, gives the anterior part the appearance of a distinct segment; longitudinally through the centre is an elevated, sharp, muricate ridge, terminating the end of the tail with an attenuated spine; at its base are situated a pair of short and reflected teeth: the posterior margin is slightly elevated, having its edge armed with a row of sharp spines pointing backwards; on the outer edge are two narrow, rather thick, serrate and acuminate leaflets, inserted into a moveable peduncle; their motion is lateral, and when at rest the superior shuts over the inferior one like the sticks of a fan. At the origin of the tail inferiorly, on each side of the vent so as to conceal it, are inserted in pairs eight membranous laminæ, meeting each other by a longitudinal line in the centre, when they form the perfect figure of a heart; they are entirely covered by the external pair, which is rather thicker, and is diagonally articulated.

Males more numerous than females.

Females carry their ova between scales under the thorax. *Ova* orbicular, nearly a line in diameter, of a fine orange colour.

Colour of the animal, an olivaceous green.

Length two and three quarter inches. Breadth two and one quarter.

Hab. Seas, along the coast of Patagonia, Cape Horn, New South Shetlands.

Cabinet of the Albany Institute.

Profesor Eaton, in his Geological Text-Book, has created a genus of Trilobites, to which he applies the name *Brongniartia*; comprising B. isotela, (Isotelus gigas. De Kay.) B. carcinodea, (Triarthus Beckii. Green.) and B. platicephala, (Asaphus platycephalus. Stokes.) Dr. Green in his Monograph of Trilobites, has justly thought proper to retain the genus of Dr. De Kay. His second species is the head of either an Asaphus or Paradoxide of Brongniart, and was previously described by Green, leaving the A. Platycephalus, which is well known to come under the genus Isotelus. The name of *Brongniartia* then, being unoccupied, I have employed it for this interesting animal, in honor of Professor Alexander Brongniart, not only for the eminence he has attained in science, but in consideration of his having been the first individual that ever attempted a systematic arrangement of the trilobites; and *trilobitoides*, from its resemblance both in form and appearance to these fossils.

EXPLANATION OF THE PLATES.

Plate I.

Figure 1. Superior view of the animal, natural size
Inferior, do do do

Plate II.

1. Head deprived of appendages.
2. A transverse section, through the first articulation after the head.
3. Mandible with the Palpus.
4. Maxillæ. a. superior. b. inferior.
5. Tongue.
6. Labium.
7. Branchial appendages.*
8. Paradoxus Boltoni.

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* From 3 to 7, enlarged.

Remarks on the New South Shetland Islands.

During one of those calms which most generally succeed to the celebrated "Pamparos" along the coast of Patagonia, the seamen employed themselves in catching some of the fine bottom fish, that are so abundantly to be obtained after making soundings. They comprise chiefly the whole of Cuvier's family of Gadites. On examining the contents of the stomach of several of an undescribed species of Phycis, I was struck by the resemblance of some Crustacea that I obtained, to the *Paradoxus boltoni*, figured and described in the fourth volume of the Journal of the Adademy of Natural Science of Philadelphia. On referring to that work, which I fortunately had on board, I was convinced that this animal came nearer to the long lost family of Trilobites than any thing hitherto discovered. They were scarcely more than an inch in length, and most of them partially decomposed. That part which particularly attracted my attention, was the lunate markings on the head of Dr. Bigsby's figure, corresponding in a wonderful manner, both in form and situation, to the eyes of this animal, although the fossil is represented as being deficient in these organs. In fact, I think it doubtful if any of the trilobites were destitute of eyes, the circumstance of their never having been found in some of the few fragments that we possess any knowledge of, is certainly no evidence that they did not exist. In some of the Crustacea that I collected in the southern ocean the eyes are extremely small and situated on the external margin of the head, very near to its edge: had but a small portion of this part of the shell been mutilated, we should have been put to no small difficulty in assigning to them organs of vision.

After landing at several places along the coast and spending some days at Staaten Land, we proceeded to the new South-Shetland islands, which are situated between 61 and 63° of south latitude, and west longitude 54 and 63. They are formed by an extensive cluster of rocks rising abruptly from the ocean, to a considerable height above its surface. Their true elevation cannot easily be determined, in consequence of the heavy masses of snow which lie over them, concealing them almost entirely from the sight. Some of them however, rear their glistening summits to an altitude of about three thousand feet, and when the heavens are free from clouds, imprint a sharp and well defined outline upon the intense blueness of the sky: they are divided every where by straits

and indented by deep bays, or coves, many of which afford to vessels a comfortable shelter from the rude gales to which these high latitudes are so subject. When the winds have ceased to blow and the ocean is at rest, nothing can exceed the beautiful clearness of the atmosphere in these elevated regions. The numerous furrows and ravines which every where impress the snowy acclivity of the hills, are distinctly visible for fifty or sixty miles, and the various sea-fowl, resting upon the slight eminences and brought in strong relief against the sky, ofttimes deceive the experienced eye of the mariner by having their puny dimensions magnified in size to those of the human form.

The ocean in the vicinity, as far as the eye has vision, is here and there studded with ice bergs, varying in magnitude from a few feet to more than a mile in extent, and not unfrequently rising two hundred feet in the air, presenting every variety of form, from the snug whitewashed cottage of the peasant, to the enormous architectural pile, containing either broadly expanded Grecian domes, or having the many lofty and finely attenuated spires of some Gothic structure.

The sun, even at midsummer, attains but a moderate altitude in these dreary regions, and when its horizontal beams illumine these masses of ice, their numerous angles and indentations catching the light as they move along, exhibit all the beautiful gradations of colour from an emerald green to that of the finest blue. Some of them whose sloping sides will admit of their ascent, are tenanted by large assemblages of Penguins, whose chattering noise may be heard on a still day at an incredible distance over the clear smooth surface of the sea. When the storms rage and the ocean rolls its mountain wave against their slippery sides, the scene is truly sublime. Tall columns of spray shooting up far above their tops, soon become dissipated in clouds of misty white; gradually descending, they envelope the whole mass for a short space of time, giving to it much the appearance of being covered with a veil of silvery gauze. When thus agitated they not unfrequently explode with the noise of thunder, scattering their fragments far and wide over the surrounding surface of the deep. These hills of ice are borne onwards at a considerable rate by the power of the wind and the velocity of the current—when so, they sweep along with a majesty that nothing else can equal.

The sky too in these latitudes presents a very singular aspect; being, most generally filled with innumerable clouds, torn into rag-

ged and irregular patches by the wild gales which every where race over the Antarctic seas : the sun as it rises or sets, slowly and obliquely in the southern horizon, sends its rays through the many openings between, tinging them here and there with every variety of hue and colour, from whence they are thrown in mild and beautiful reflections upon the extensive fields of snow which lie piled on the surrounding hills, giving to the whole scene for a greater part of the long summer day, the ever varying effect of a most gorgeous sunset.

Although many of the scenes about these islands are highly exciting, the effect produced on the mind by their general aspect is cold and cheerless to an unusual degree, for on their lonely shores the voice of man is seldom heard: the only indication of his ever having trod the soil, is the solitary grave of some poor seaman near the beach, and the only wood that any where meets the eye, are the staves that mark its dimensions ; no sound for years disturbs the silence of the scene, save the wild screech of the sea-birds as they wing their way in search of their accustomed food—the incessent chattering of the congregated Penguins—the rude blasts, tearing among the icy hills—the sullen roar of the waves, tumbling and dashing along the shores, or the heavy explosions of the large masses of snow falling into the waves beneath, to form the vast ice-bergs which every where drift through the southern ocean.

The shores of these islands are generally formed by perpendicular cliffs of ice frequently reaching for many miles, and rising from ten feet, to several hundred in height. In many places at their base, the continued action of the water has worn out deep caves with broadly arched roofs, under which the ocean rolls its wave with a subterranean sound that strikes most singularly on the ear, and when sufficiently undermined, extensive portions crack off with an astounding report, creating a tremendous surge in the sea below, which as it rolls over its surface, sweeps every thing before it, from the smallest animal that feeds on its shallow bottom, to those of the greatest bulk. Entire skeletons of the whale, fifty or sixty feet in length, are not unfrequently found in elevated situations along the shores many feet above the high water line, and I know of no other cause capable of producing this effect. Whales are very common in this vicinity, and in calm weather great numbers of them may be seen breaking the surface of the ocean in the many intervals which occur between its numerous ice-bergs, sometimes sending forth volumes of spray, at others, elevating their

huge flukes in the air to descend head first, as it were, to fathom the ocean's depth. When they perish either from accident or some more natural cause, their carcasses in drifting towards the shore are overtaken by these billows and thrown thus far upon the land, here they are left by the retiring wave, and in a few hours their bones become perfectly denuded by the numberless sea-birds that feed upon the flesh. It is after these waves have subsided that the animal here described, together with several other equally interesting crustacea may be obtained in considerable numbers.

The geological features that these islands present in those highly favored situations, where the continuous power of the winds has swept bare the rocks, correspond in a great measure with their desolate and dreary aspect. They are composed principally of vertical columns of basalt, resting upon strata of argillaceous conglomerate; the pillars are united in detatched groups, having at their bases sloping banks constructed of materials which are constantly accumulating by fragments from above. These groups rise abruptly from the irregularly elevated plains, over whose surface they are scattered here and there, presenting an appearance to the eye not unlike some old castle crumbling into ruin, and when situated upon the sandstone promontories that occasionally jut out into the sea, they tower aloft in solitary grandeur over its foaming waves; sometimes they may be seen piercing the superincumbent snow, powerfully contrasting their deep murky hues with its spotless purity. Ponds of fresh water are now and then found on the plains, but they do not owe their origin to springs, being formed by the melting of the snow.

The rocky shores of these islands are formed by bold craggy eminences standing out into the sea at different distances from each other, from whose bases dangerous reefs not unfrequently lie out for several miles in extent, rendering it necessary for navigators to keep a cautious watch, after making any part of this coast: the intervals between these crags are composed of narrow strips of plain, constructed of coarsely angulated fragments of every variety of size, which at some previous period have fallen from the surrounding hills. They slope gradually down to the water terminating in a fine sandy beach: a few rounded pieces of granite are occasionally to be seen lying about, brought unquestionably by the ice-bergs from their parent hills on some far more southern land, as we saw no rocks of this nature in situ on these islands. In one instance, I obtained a boulder nearly a foot in diameter

from one of these floating hills. The action of the waves has produced little or no effect upon the Basalt along this coast, as its angles retain all the acuteness of a recent fracture, but when the conglomerate predominates, the mass is generally rounded.

The ocean about these shores is generally of great depth, the materials which constitute its bottom are finely comminuted particles having their origin from the decomposition of the neighbouring rocks. Our stay at these islands occupied a period of four weeks, during which time we observed but one ebb and flow of the tide in twenty-four hours. I know not if this be universal, but have been informed by mariners familiar in these seas, that they have generally found it so; if it should prove to be the case, it is a very singular phenomenon.

Not a day occurred that snow did not fall or ice make on our decks, and during the time we spent between the latitudes of 60 and 70° south, and 54 & 101 west longitude, which was more than two months, we found the current setting with considerable velocity from the south-west to the north-east. The prevailing winds were also westerly, most commonly from the south-west and north-west.

The colour of the basalt is generally of a greenish black. The prisms are from four to nine sided, most commonly however of but six, and from three to four feet in diameter; their greatest length in an upright position above the subjacent conglomerate is about eighty feet. Their external surfaces are closely applied to each other, though but slightly united, consequently they are continually falling out by the expansive power of the congealing water among its fissures. When they are exposed to the influence of the atmosphere for any length of time, they are for a small depth of a rusty brown colour, owing no doubt to the iron which they contain becoming partially oxydized: sometimes they are covered by a thin coating of quartz and chalcedony.

Clusters of these columns are occasionally seen reposing on their side in such a manner as to exhibit the surfaces of their base distinctly, which is rough and vesicular. When this is the case they are generally bent, forming quite an arch with the horizon. When they approach the conglomerate for ten or twelve feet, they lose their columnar structure and assume the appearance of a dark coloured flinty slate, breaking readily into irregular rhombic fragments: this fine variety in descending, gradually changes to a greenish colour and a much coarser structure, until it passes into a most perfect amygdaloid, the cavities being chiefly filled

with quartz, amethyst, and chalcedony. Sometimes an interval of about forty or fifty feet occurs between these columns, which space is occupied by the amorphous variety elevated to some considerable height against them, their edges in this case are not at all changed by the contact.

The basalt is very tough and hard, the effect produced upon it by the action of the file is very slight: the steel elicits no sparks: the fragments are angular with an imperfect conchoidal fracture: its structure is coarsely granular and uneven, and is composed essentially of hornblende, feldspar, and a greenish substance in grains much resembling epidote: crystals of leucite of a yellow and reddish tinge are disseminated throughout the mass whose fractured surfaces strongly reflect the rays of light to the eye: in some places it sensibly affects the needle, owing no doubt to its iron. Veins of quartz frequently traverse the fine variety, some of them containing beautiful amethysts.

The basis rock of these islands, as far as I could discover, is the conglomerate which underlies the basalt. It is composed most generally of two or three layers, about five feet in thickness each, resting one on the other and dipping to the south east at an angle of from twelve to twenty degrees. These layers are divided by regular fissures into large rhombic tables, many of which appear to have recently fallen out, and now lie scattered all over the sloping sides of the hills, so that the strata when seen cropping out from beneath the basalt, present a slightly arched row of angular projections of some considerable magnitude and extent.

These strata are chiefly composed of irregular and angular fragments of a rock, whose principal ingredient appears to be green earth, arranged with both a granular and slaty structure, united by an argillaceous cement; the whole mass when moistened by the breath giving out a strong odour of that earth. The upper portion of this conglomerate for a few feet, is of a dirty green colour, and appears to be constructed by the passage of the amygdaloid into this rock, the greenish fragments predominating, and they are united to each other principally, by zeolite of a beautiful light red, or orange colour, together with some quartz and chalcedony; a few crystals of lime cause it to effervesce slightly in some places. These minerals seem in a great measure to replace the earthy cement. In descending a few feet further, the green fragments gradually decrease in number and become comparatively rare,

the minerals also give place to the cement until the whole mass terminates below in a fine argillaceous substance, with an imperfect slaty structure and a spanish-brown aspect.

This rock being much softer in its nature than the basalt and more affected by decomposing agents, the number of fragments are consequently greater in proportion, and much more finely pulverised, forming the little soil, which supports some of the scattered and scanty patches of the vegetation of these islands.

The minerals embraced in this rock are generally confined to its upper part where it unites and passes into the incumbent amygdaloid, many of them are also in common with that rock. They consist chiefly of quartz, crystalline and amorphous, amethyst, chalcedony, cachalong, agate, red jasper, felspar, zeolite, calcareous spar in rhombic crystals, sulphate of barytes, a minute crystal resembling black spinelle, sulphuret of iron and green carbonate of copper.

The only appearance of an organized remain that I any where saw, was a fragment of carbonized wood imbedded in this conglomerate. It was in a vertical position, about two and a half feet in length and four inches in diameter: its colour is black, exhibiting a fine ligneous structure, the concentric circles are distinctly visible on its superior end, it occasionally gives sparks with steel, and effervesces slightly in nitric acid.

There are a number of active volcanoes in the vicinity of these islands, indications of which are daily seen in the pieces of pumice found strewed along the beach. Capt. Weddel saw smoke issuing from the fissures of Bridgeman's island, a few leagues to the N. E. Palmers land, situated one degree south: what little is known of it, which is only a small portion of its northern shore, contains several. Deception island also, one of this group, has boiling springs, and a whitish substance like melted felspar, exudes from some of its fissures.

The rocky fragments on these islands are generally very hard and little liable to the disintegrating influence of the atmosphere, and rarely indeed are they subject to a power capable of agitating them sufficiently to remove even the acuteness of their angles, consequently but a small quantity of soil can any where be found, and when discovered, being destitute of the necessary ingredients that give fatness to the earth elsewhere, it affords but a few scattered patches of vegetation, which appear to struggle hard for the small

portion of vitality they enjoy. The *Usnea fasciata*, Torrey,* is most common. A species of Polytrichum resembling the alpinum of Lin. one or two lichens and a fucus found in the sea, along the shores—when you add to these an occasional plant of a small species of avena, you complete the botanical catalogue of the islands.

The only vertebral animals ever observed on these islands are very few in number, and confined to the amphibia carnivora of Cuvier; all being embraced in the genus Phoca. The P. leonina, Lin. (sea elephant) is the largest of the species, sometimes attaining the length of twenty-five feet, and is regularly proportioned. These animals are remarkable for the powerful strength of their jaws. When attacked, and wounded in such a manner as to be unable to reach the sea, in the struggle, either through agony or rage, they not unfrequently take up considerable sized stones with their mouth, and break them into a number of fragments between their teeth: sometimes they seize upon the lance, breaking it instantaneously, or else, bending it in such a manner as to render it perfectly useless. The sea leopard is not so large, but is a far more beautiful animal. P. vitulina, Lin. (fur-seal.) This beautiful little animal was once most numerous, but was almost exterminated by the sealers at the time these islands were first discovered. There is also a fourth species, which I have no recollection of ever seeing the slightest notice of. It is probably not common, as I saw but one; it was standing on the extremities of its fore-feet, (flippers) the head and chest perfectly erect, abdomen curved and resting on the ground, the tail was also in an upright position: the animal in this attitude bore a striking resemblance to the representations we frequently meet with of the "mermaid," and I think it was undoubtedly one of the animals of this genus that first gave origin to the fable of the maid of the sea. I regret that I could not obtain a nearer view of this interesting animal. When I approached within one hundred feet, it threw itself flat and made rapidly for the sea: it appeared about twelve or fifteen feet in length, and distinctly more slender in proportion than any of the other species, so much so that the motion of the body when moving seemed perfectly undulating. Some of the seamen had seen them frequently on a former voyage, and mentioned that they were known among sealers by the name of sea-serpent, from this circumstance. Some

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* Silliman's Journal, vol. 6, page 104. Imperfectly described in consequence of the badness of the specimen.

of the teeth were brought to me which had been picked up on the beach. The crown of the grinders is deeply and singularly five lobed.

When these animals resort to the shores for the purpose of breeding or shedding their hair, they are in fine condition. During this time they require no food, existing by the absorption of their fatty matter: if killed at this period, you generally find a quantity of small stones in the stomach, swallowed most probably for the purpose of keeping that organ distended and preventing its internal surfaces from adhering to each other. When the season for returning to the sea arrives, these stones are ejected on the beach, and they proceed in search of their ordinary food, which is chiefly penguins. A singular character in the habit of these animals is the faculty they possess of shedding tears when in any way molested. The eyes becoming suffused and the large tear-drops chasing each other in quick succession over their wrinkled faces, creates quite a sympathy in the breast of the beholder. Of the Cetacea inhabiting the ocean among these islands, the Balæna physalis (fin whale) with a smooth belly, is very numerous: the B. mysticetus (right whale) is occasionally seen. The Grampus and Dolphins are quite common, and a species of Porpoise which I had not before seen, occurs in great numbers. From their appearance in the water their colour seemed dark, with a broad, somewhat waved white line, extending from the posterior and inferior part of the head, backward and upward to the dorsal fin: a second and similar one commences on the abdomen immediately below the termination of the first, and ends at the origin of the tail above: these marks are distinctly visible as they glide through the sea. They are called sea skunks by the sailors. I am told they are confined to high southern latitudes.

The birds which frequent these islands are much more numerous than any of the other classes of animals; of penguins there are five species. The Aptenodytes patagonica, Gm.* (king penguin) is the largest and by far the most beautiful of the species, and may be seen in great numbers covering the shores for some considerable extent. They are remarkably clean in their appearance, not a speck of any kind is suffered for a moment to sully the pure whiteness of the principal part of their plumage: their upright

* For a further account of the animals and birds here mentioned, I must refer to the four voyages of Capt. B. Morrell, jr. and those of Capt. Edmund Fanning, two popular works recently published in New-York.

position, uniform cleanliness, and beautiful golden yellow cravat, contrasts finely with the dark back-ground by which they are relieved, so that the similitude is no unapt one, which compares them to a regiment of soldiers immediately after parade. The females lay but one egg on the bare ground, which is rather larger than that of a goose, and of about equal value as an article of food, but differs a little in shape, being more tapering at its smaller end. The egg lies between the feet, the tail being sufficiently long to conceal it effectually from the sight. When approached they move from you with a waddling gait, rolling it along over the smooth surface of the ground, so that a person not acquainted with the fact might pass through hundreds of them without discovering it. The Spheniscus antarcticus, Shaw. (rookery penguin) is more numerous than any of the other species, assembling together in vast congregations, occupying the smooth strips of plain for a mile or more in extent; passing through them, they barely give you sufficient space, picking at your legs, and keeping up a continual chatter. Their whole appearance as you walk along, brings powerfully to your recollection the story of Gulliver, striding among the Lilliputians. The Chrysocoma saltator, C. torquata, C. catarractes, Shaw, are occasionally found along the beach, and scattered among the others. These birds swim with great velocity through the sea and may be seen several feet in depth shooting along in every direction, at short intervals rising to its surface, darting out and in again, at the same time, uttering a quick sound very similar to that produced by a single blast on a split quill. Phalacrocorax graculus, Shaw. Sterna hirundo ? Lin. Diomedea exulans, Lin. and fuliginosa, Lath. Daption capense—antarcticum—niveum, Shaw. Fulmarius giganteus, and antarcticus, Shaw, are all very common. Procellaria pelagica ? Lin. This is much smaller than any I observed in other parts of the ocean, and may probably prove a distinct species. Larus eburneus ? Gmel. Lestris catarractes, Tem. are also common. Chionis Forsteri, Shaw. (sheath bill.) This is the white pigeon so often mentioned by mariners as inhabiting the islands of the southern ocean, it is easily caught by the hand, and soon becomes domesticated. We kept a number of them several days after leaving these islands, they ran about the decks of the vessel apparently without any disposition to leave them, feeding from the hand of any individual that offered them food.

The mollusca are very few, though unique. An interesting species of Pholas; a beautiful Nucula, and a fine Patella, neither of which I think have been described, comprise all that we saw.

The existencc of a southern continent within the antarctic circle is, I conceive, a matter of much doubt and uncertainty, but that there are extensive groups, or chains of islands yet unknown, I think we have many indications to prove, and were I to express an opinion, I would say, that our course from the south Shetlands to the southwest, until we reached the 101° of west longitude, was at no great distance along the northern shores of one of these chains. The heavy clouds of mist which encircled us so often, could arise from no other cause than that of the influence of large quantities of snow or ice, on the temperature of the atmosphere: the hills of floating ice we encountered, could not form elsewhere than on the land. The drifting fuci we daily saw, grow only in the vicinity of rocky shores, and the penguins and terns, that were almost at all times about us, from my observation of their habits, I am satisfied, never leave the land at any great distance. During our cruize to the southwest above the 60° of south latitude, we found the current setting continually at a considerable rate towards the northeast, bearing the plants and ice along in its course, some of the latter embracing fragments of a rock, the existence of which, we could discover no where on the islands we visited. When the westerly winds drew well toward the south, we were most generally enveloped in banks of fog, so dense that it was with difficulty we could distinguish objects at the distance of the vessel's length. When Palmer's land becomes properly explored, together with the known islands situated between the longitude of Cape Horn and that of Good Hope, I think they will prove to be the north eastern termination of an extensive chain, passing near where Capt. Cook's progress was arrested by the firm fields of ice in latitude 71° 10′ s. and west longitude about 105°; had that skilful navigator succeeded in penetrating this mass of ice, he would unquestionably in a short time have made the land upon which it was formed. Capt. Weddel after passing the icy barrier to the east of the South Shetlands, succeeded in reaching the 74° 15′ south, (the highest latitude ever attained by man,) and found in crossing this chain and progressing towards the south, that the sea became more free of ice, and the weather almost as mild as summer, evidently proving I think, that the south pole

can be nearly approached, without incuring any great degree of hazard in the attempt. But for further information on the practicability of reaching the south pole, I must refer to the judicious remarks of Capt. Edmund Fanning of New-York, contained in his account of several voyages to the southern ocean, with which I perfectly coincide ; and will conclude with the regret that the government of the United States, with a population whose daring enterprize has already carried our flag into the remotest corners of the globe, could not be induced to forward an expedition, the expense of which would little exceed that of a vessel doubling Cape Horn. They might thus settle this interesting question, and also determine with certainty the situation, magnitude, and extent of these lands, and by that means open a new source of revenue to the country in the oil and fur animals which must necessarily exist in these high southern regions.

ART. V. *On the Functions of the Moon, deduced from Observations made on the total Eclipse of the Sun, on the 16th day of June, 1806, by* SIMEON DE WITT, *1st Vice President.*

Read March 2, 1825.

As I am persuaded that the public has never been presented with a correct representation of a total eclipse of the sun, and as the appearances, exhibited by this rare phenomenon, may furnish matter for some interesting reflections and reasonings, I now do myself the pleasure to present to the Institute a delineation of the eclipse which occurred on the 16th June, 1806. It is an exact copy of one which I sent to the American Philosophical Society, with a letter addressed to Dr. Rush, then its vice president, of which the following is a copy.

"*Albany, Dec. 1st* 1806.

"DEAR SIR,

"With this I send you, for the American Philosophical Society, a painting, intended to represent the central eclipse of the sun, on the 16th June last. It is executed by Mr. Ezra Ames, an eminent portrait painter of this place, and gives, I believe, as true a representation of that grand and beautiful phenomenon, as can be artificially expressed.* The edge of the moon was strongly illuminated and had the brilliancy of polished silver. No common colours could express this. I therefore directed it to be attempted, as you will see, by a raised silver rim, which in a proper light, produces tolerably well the intended effect. As no verbal description can give any thing like a true idea of this sublime spectacle, with which man is so rarely gratified, I thought this would not be an unwelcome present to the society, or an improper article to be preserved among its collection of subjects for philosophical speculation. But in order to have a proper conception of what is intended to be represented, you must transfer your ideas to the heavens and imagine, at the departure of the last ray of the sun in his retreat behind the moon, an awful gloom in an instant diffused over the face of nature, and round a dark circle near the zenith, an immense radiated glory, like a new creation, bursting on the sight, and for some minutes fixing the gaze of man in silent amazement.

* A copy of this drawing is given in Plate 3.

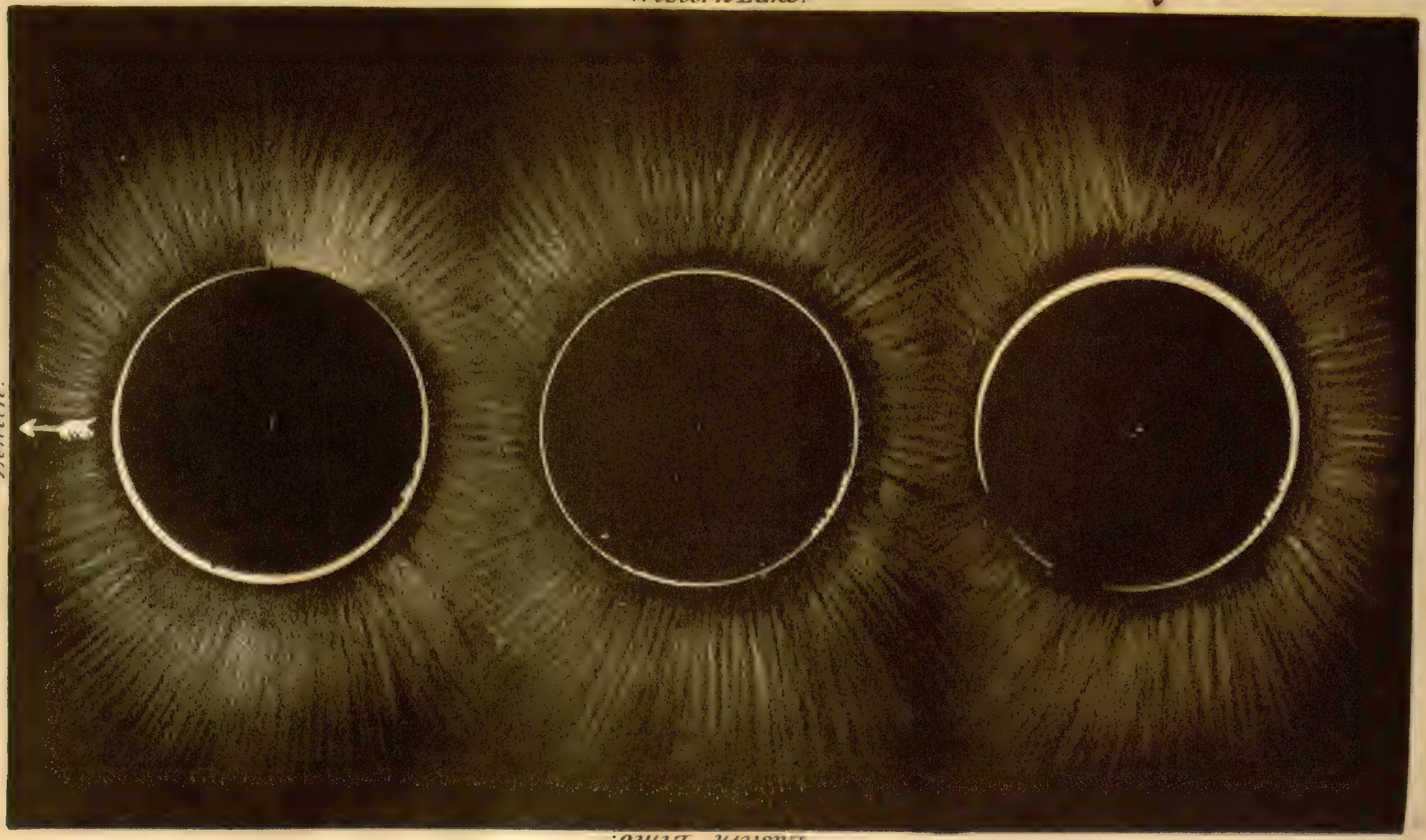
TOTAL ECLIPSE OF THE SUN MAY 17 1865.

From a Photograph taken at Athens for Harper's

Fig.1st

Fig.2nd
Western Limb.

Fig 3rd



Zenith.

Eastern Limb.

"I cannot account for the brightness that surrounded the moon, beyond what may be supposed to be her atmosphere, in any other way than by considering that body as possessing phosphoric properties in an eminent degree, and having the faculty of ejecting continually the light it has received from the sun and stars, after perhaps having partially decomposed it, in a manner somewhat similar to the progress by which air is imbibed and emitted with changed properties by the leaves of vegetables, and also for purposes not altogether dissimilar. Such an emission of light, which cannot be perceived by us at any other time than when the sun is totally eclipsed, must necessarily cause an appearance like what was displayed on that occasion.

"That the light which comes from the moon to us has undergone some change is, I think, evident from its having a paler colour than that which comes from the sun. The luminous circle on the edge of the moon, was remarkably so. It had that bluish tint which distinguishes the colour of quicksilver from a dead white.

"I attempted to make observations on the stages of the eclipse, but, for the want of a meridian and glasses of sufficient power, I am sorry I could not make them with the accuracy I wished; I however send them as they are. They may possibly be of some use among the collections from other quarters. I have also taken some pains to ascertain the extent of the moon's shadow, in a northerly and southerly direction. The best information I have received is from Judge Thorn, of Washington county, who assures me that the edge of the shadow passed nearly along the south bounds of Campbell's patent, in the town of Granville, which, on my map of the state, lies in lat. 43° 22′ and long. 45′ east of the meridian of New-York; and from Johannes Miller, Esq. of the county of Orange, who determined the southern edge of the shadow in the town of Montgomery, to have crossed the road leading from Ward's bridge to Goshen, three miles and five chains from the bridge. This will be about lat. 41° 30′ and long. 0° 14′ west from the meridian of New-York. The middle of a straight line between these two places falls on Hudson's river in lat. 42° 26′, where therefore the centre of the shadow must have passed. If it would be of any use for the purpose of correcting the lunar tables to ascertain with precision the diameter of the moon's shadow, and the exact part of the earth on which it fell, it might be done with great accuracy in this case, as the path of the shadow

was nearly at right angles with our meridian. And the truth of the result would therefore chiefly depend on observations to determine the latitude of two places nearly north and south of each other."

For this communication I received a special and flattering acknowledgement from the Society, and was told that an engraving of the delineation of the eclipse which I had sent would have been made, had not one already been prepared "from a drawing of Mr. Ferrers, who observed the eclipse at Kinderhook, which very closely resembled mine." I have introduced this letter on the present occasion for the purpose of pursuing, to a greater length, some of the ideas suggested in it, and which may lead to a wide field of speculation.

I have said in my letter to Dr. Rush, that I could not account for the brightness that surrounded the moon, beyond what might be supposed to be her atmosphere, in any other way than by considering that body as possessing phosphoric properties in an eminent degree: I shall now make some observations for the purpose of elucidating that remark.

Light in itself is invisible; its existence, like that of soul or spirit, can only be known by its effects or operations perceptible to our senses. The existence of light is made known to us only, either by its rendering visible the body from which it emanates, or the bodies on which it falls. The luminous streams which proceeded from the moon, during the total eclipse of the sun, to the distance of some thousands of miles, could not then be simple light, but some grosser material which either contained the matter of light in itself, and which was made visible by sending that light to the eye, or it must have been something on which light fell, and was thereby made visible, in the same manner that the common objects that surround us are made visible.

The latter supposition is inadmissible, because there is no evidence that the moon has an atmosphere of any great extent, and therefore there is nothing about her, beyond this, capable to support matter from which light can be reflected, certainly not to the extent of the luminous rays that proceeded from her during the eclipse. The only possible way then, according to my apprehension, to account for this appearance is, to consider the moon as a body incessantly pouring out, not light merely, but something constituted of minute particles, each possessing precisely the same properties which the sun and ignited bodies possess, that is, to

render themselves visible, by sending rays of light to the eye, not by reflection but by direct emanations from themselves.

This is what I call *phosphoric* or *phosphorescent*, as a property eminently possessed by the moon ; perhaps strictly considered, it may be more properly called a property of each particle of matter in those rays which proceeded from the moon, and formed what has been called the *glory* that surrounded her.

On such subjects it is impossible to avoid theory, because the requisites, demanded by the rules of philosophizing, are not attainable here, that is, to admit nothing, as the premises of a syllogism, but facts proved by experiment, or in order to arrive at a moral certainty, facts deduced from undoubted analogy. For the manner in which I shall further treat this subject, I may then plead an illustrious example, to wit, Herschel, who has stratified the universe with suns, and placed ours in one of his strata, as a speck in that which compose the milky way. By reasoning from analogy, Dr. Franklin arrived at the conclusion that lightning and electricity were the same, and he thus arrived at truth, as certainly as if his subsequent experiments to prove it had never been made, although the conviction of it, on the minds of others, might not have been so complete. With these preliminary remarks for an apology, I shall now give my theory on the subject under consideration, with such reasons in support of it as its nature will admit.

Throughout the universe, as far as our observations can extend, every thing is in a state of activity and mutation, and every substance in nature seems to be designed, either to impart some of its own properties to others for their benefit, or in some way to subserve their purposes. It is true our limited knowledge does not permit us to perceive all this in every subject submitted to our view, but the further our knowledge extends the further do we perceive that this is a law, established in the councils of the omnipotent, allwise and illimitably beneficient Author of all that fills the universe, by which every thing without exemption is governed. It is further to be observed that nothing as a cause is limited in its production to a single effect, but that every thing which is operative as a cause, produces as many effects as from its nature it is qualified to produce. In order to illustrate this let us take the sun as an example. What may be the extent of his services to the worlds that compose the solar system, and others beyond it, we cannot tell. But this we do know, that it is the sun which makes

every thing visible, and should he be designed for this purpose alone, considering how perfectly that purpose is answered, it must be pronounced a contrivance worthy the almighty Architect; but he is made to answer other purposes, wonderful beyond conception and countless in number. By his influence all the phenomena of our globe and every thing around it are produced; without him our earth and all it supports would be as inanimate and inert as an icicle, appended to the skirts of the creation. He puts into a state of activity the latent heat contained in all earthly substances, by which all the mutations in the animal, vegetable, mineral and aerial departments of nature are produced: subjects of human research interminable, and the increasing objects of our wonder.

The sun raises the waters of the ocean, lakes, rivers, and every other receptacle of them, to the firmament, along which the burden is carried in clouds, and scattered over every region, for the refreshment and invigoration of the vegetable creation. The sun causes the tempest, the thunder and the lightning, as well as the breeze and the zephyr, which, in the sultry season, play so gratefully about the animal frame. The sun is the primum mobile in the laboratory where diamonds, gold, silver, and all other metals and minerals are manufactured. It is the sun that paints, not only the rainbow, but the flowers of the garden and of the field. It is he who hatches, from their embryos, rears to maturity, and sustains, during their existence, the myriads of animated beings that swarm in the earth, the air and the waters of our globe. It is he who arranges and gives those inimitable tints to the magnificent drapery of heaven, which overhangs him, as he retreats behind our horizon in the west.

The moon is a domestic attendant on our earth, and seems evidently intended as her special handmaid. It is therefore to be presumed that her office is to render us numerous services. Those which are universally recognized are her giving us light in the absence of the sun, and causing the tides of the ocean. But can this be all? On the principle that every cause must produce as many effects as its nature is qualified to produce, this is not to be presumed. Let us now enquire what other good services she may render us. The appearances exhibited during the eclipse shewed us that there is an emanation of something from the moon. This, from the nature of things, could be seen by us only in a lateral direction. It was not caused by the eclipse, but only rendered per-

ceptible by that circumstance. It may therefore be concluded that this emanation is not occasional but perpetual, and that it is in all directions, and must therefore be equally directed towards us as to other parts of our system. It is therefore to be presumed that our atmosphere receives a share of its influence, and that influence must be for salutary purposes; for the whole economy of nature in all its departments, is evidently formed on a plan of reciprocal benefits. There is no such thing as a malignant star, as astrologers have imagined.

Modern discoveries have brought to our knowledge the fact that the leaves of plants and the lungs of animals perform analogous functions. The lungs of animals inhale the atmospheric fluid, take from it what is salutary, and impart to it what is noxious to the animal system. The vegetable then inhales the same atmospheric fluid, takes from it, as its salutary food, what was ejected by the animal as noxious, and sends it back to him, thus purified, for a second inspiration, and thus the animal and vegetable breathe into each others' lungs the air which is essential in its qualities to the vitality and nourishment of both. In the same manner it may be supposed that the earth and moon may render each other reciprocal services. The emanations from the sun may be considered as the atmosphere in which the earth and moon are immersed. The moon inhales and retains within herself what of it is salutary, and sends it back with what is noxious to her constitution, and this same matter the earth may then inhale, take from it what has been ejected as noxious by the moon, but as salutory to the earth, for her reinvigoration in the performance of her proper functions or to be thereby supported (if the phrase may be allowed) in a constant healthy condition. This matter is the phosphoric eufflvium before noticed, as radiating from the moon, and which, being ejected by a strong repulsive pewer, will, like light, continue its course until it is intercepted by the earth.

These observations apply to the constant and ordinary services of the moon to her mistress. What I have farther to remark is about her extraordinary services, when she steps in between us and the sun, especially when she thereby causes a total eclipse, such as that which has elicited these comments.

The late Chancellor Livingston favored the Society for the promotion of Useful Arts with a very interesting memoir on the com-

parative effects of the shades of different trees on vegetation, and as I purpose to make use of the facts he has stated, in support of what I have further to say on this subject, it will be necessary for me to make considerable quotations from that paper. It is contained in a letter to Dr. Mitchill in 1792—after some introductory remarks he says—

"I shall be able to offer you nothing on the subject of experimental husbandry that will merit your attention, unless it be an observation which I have frequently made, but with more attention this year than before, and which may, I conceive, if properly pursued, lead to important consequences. I mean the baleful effect of the *shade* (if I may so call it) of some trees upon the vegetation of corn. I will state the facts as they have appeared to me, and you will the more readily comprehend my ideas. I planted maize on the west side of a young wood, consisting of oaks, poplars, a few chestnuts and a large mulberry, somewhat advanced in the field. The shade made by the rising sun extended nearly across the field and was not entirely off until about ten o'clock. I remarked that as far as the shade of the chestnut reached, the corn was extremely injured, it was yellow and small: the conical shape of the morning shade, from particular trees, might be traced to a considerable extent, in the sickly appearance of the plants. The black oaks were likewise injurious, but less so than the chestnuts, the poplar was very little so. Near the mulberry tree, the corn was covered by its shade for a very long time every morning, and though not so large as that which had more sun, maintained a healthy appearance. To what cause are we to attribute this phenomenon? It is certainly not the *mere absence of light or heat*, for in this case the trees would have been equally injurious, or rather the mulberry tree would have been the most so. It is not to any *dropping from the tree*, for the corn grew under none but the mulberry. It is not to any *effluvia from the trees*, for this would either be emitted in circles or wafted irregularly by the wind. Whereas the shape of the shade was plainly traced on the corn. Were I permitted to form a conjecture upon this extraordinary circumstance, I should conclude that the mischief was not occasioned by the *shade*, but by those rays of light that actually passed through the tree, either *perforating the leaves* (for none of them are perfectly opaque) or *being brought in contact with them*, and that this

light served as a menstruum, to dissolve certain parts of the tree, noxious to the corn, and as a vehicle to convey it in the direction of the rays, (which necessarily is that of the shade.) As the injury is done in the line in which the direct rays of light pass through the tree, it must follow that neither air nor water are solvents of this body, for if they were, it would be wafted in different directions. If this idea is just, what a field does it open for important discoveries."

In 1793, Chancellor Livingston made another communication, detailing his observations on the effects of light passing through chestnut, black oak, mulberry and apple trees, on a field of *buck-wheat*, at the conclusion of which he says: "This experiment which I have made with attention, under the most favorable circumstances, as well with respect to the position of the trees, the nature of the vegetable, and the season of the year, has confirmed me in the theory I hinted to you, that the injury which some vegetables receive from the shade of certain trees, is not owing simply to the diminution of light, but either to a change the light undergoes in passing through them, or from its dissolving and becoming the vehicle of some substance noxious to certain plants, contained in the tree through which it passes. There are few facts in physics that do not admit of useful deductions. I have taken pains to establish this, that you or some other chemist of more leisure and equal information may make them."

For the purpose of my theory I will now take it for granted that the observations of Chancellor Livingston satisfactorily prove that the rays of the sun serve as a menstruum to dissolve or decompose certain substances, and after such decomposition, can and do, carry with them parts of such substances and impart them to remote objects. Or that, in some other manner, properties inherent in the leaves of trees, are by the sun-beams conveyed to distant objects. The luminous girdle round the moon (if I may so call it) what was it? or what was the cause of its appearance? There must have been something occupying that space, with properties, either to *radiate light* or to *reflect it*, or, when the sun was behind the moon, to *refract a portion of his rays* so as to fall in parallel lines on the eye. In support of the two first suppositions no facts or reasons are known, sufficient to raise a plausible presumption. The last supposition is therefore that which I shall adopt; and for its support it requires only the admission that the moon has a transparent atmosphere to the extent of this luminous girdle.

It has been positively concluded that there is no lunar atmosphere from the circumstance that stars passing behind her disappear instantaneously when they come in a line with her edge, which is alledged could not happen if there was an atmosphere about her. But let it be remembered that this conclusion will hold good only in the supposition that the matter of which the lunar atmosphere is composed, is like that of ours, that is, decreasing gradually in density from the surface of the body it surrounds, as it recedes from it. But the atmosphere of the moon, which causes the appearance under consideration, is evidently of a uniform density; for the exterior edge of the luminous girdle was as strongly and distinctly marked as the interior, and in such case, the conclusion drawn from the instantaneous disappearance of the stars, as before mentioned, is inadmissible. It is carrying analogical reasoning too far to take, as a postulate in this case, that if the moon has an atmosphere, it must be in all respects like ours. From what has been observed it appears highly probable thatshe has an atmosphere, and that it is of a uniform density. What the matter of it is, whether water, air or something else not belonging to this earth, is immaterial: it is sufficient, for my theory, that it has the property of every other diaphanous medium, through which light passes, to refract its rays. This atmospheric girdle, let it be further remarked, was completely distinct, in its colour as well as its bounds, from the luminous streams of phosphoric light emitted from the moon, as observed during the eclipse. It must therefore have been essentially different in its nature and the cause which produced it.

There is then no way to account for this dazzling cincture about the moon, but to take the fact for granted, or rather proved, that she has an atmosphere, and that it differs from ours in the manner assumed; and further, that at the moment when a star touches the exterior edge of this atmosphere, its rays will be so refracted as to become instantly invisible.

Our atmosphere contains a great variety of heterogenous matter, such as the oxygen, hydrogen and azotic gases. What the atmosphere of the moon contains it is impossible to know; but it is presumable that it also contains a variety of heterogenous matter, and as nothing is created in vain, that, like every other thing, must be intended for useful purposes, and considering the moon as

the special attendant upon our world, these purposes must be chiefly intended for our benefit.

The rays of the sun, we know, are constituted of matter, between which and other substances, there is a mutual attraction. Their refrangibility can be accounted for on no other principle. When a ray of light falls in an oblique direction on the surface of a transparent body, at it approaches that surface it is attracted by it, and its direction is thereby changed. This is what we call refraction, and it incontestibly proves, the attractive quality of light. Now if it be admitted in this instance, it must be allowed that light possesses what chemists call elective attraction. If light then, in passing through the atmosphere of the moon, meets with matter which hås a stronger attraction to it, than to that to which it is attached, it will immediately leave it, attach itself to the ray of light, and be carried away by it, till it meets with some other substance which has a still stronger attachment to it, and there it will then be deposited.

That substance, in the case under consideration, is our earth, for whose benefit this wonderful contrivance in the machinery of nature has been devised. If it be objected to this theory, that if the light of the sun be thus refracted from behind the moon, as it is from behind the earth, before he is actually above our horizon, the light of the sun, thus refracted by the atmosphere of the moon, would be as intense as if it came without any intervention direct to the eye. The objection is readily met by noticing the effects ascribed to the moon, which necessarily require the exercise of functions which will essentially change the properties of the rays of the sun, in their passage through the atmosphere of the moon. It has already been stated that the rays of the sun do possess the property of attraction, or which is the same thing, of being attracted. This is a fact proved, and wherever this property does exist, all our observations prove elective attraction a necessary consequence and, equally so, a double elective attraction, where circumstances favour it.

I shall now make a supposition which I think must be allowed to be fortified by the strongest degree of probability. It is this. The rays of the sun, like all other existences in the material creation, as far as human research has gone, are found to be, not simple, but compounds of matter. This is proved by the prismatic analysis. The atmosphere of the moon must be of the same cha-

racter. Take these things for granted, and it must follow, that the atmosphere of the moon will take from the rays of the sun passing through it that for which it has the strongest attraction, and this attraction may be considered her natural appetite for what is necessary food, to qualify her for the due performance of her functions ; and it is moreover a natural supposition that this matter must be the most fiery part of the rays of the sun, which, being imbibed by the moon, give to her the properties of a highly charged phosphoric body, the uses of which have been already considered. The light of the sun thus transmitted will be so mellowed as to cause no unpleasant sensations in the eye that receives it. This removes the above mentioned objection to this theory.

Again, the rays of the sun, in passing through the atmosphere of the moon, will take from it that for which they have the strongest attraction and carry it to our earth ; and this, whatever it be, considering the benevolent designs manifested in every department of the creation, must be intended for our good. What this may be, in this case, is perhaps beyond conjecture ; but this we do know, that all earthly matter is subject to continual mutation, between deterioration and melioration, for the balancing of which there appears to be a provision in every branch of the economy of nature ; and matter, thus conveyed from the moon to us, may be essential for such a purpose. This can only happen in occurrences of eclipses of the sun, and hence is their utility inferred. I may here with propriety recur to the quotations made from Chancellor Livingston in confirmation of this theory, and submit the reasonings contained in this memoir in confirmation of his.

I may appeal also to the authority of Euler, who, in that constellation of philosophers, who illuminated the world in the two last centuries, has been universally acknowledged as a star of the first magnitude. He founded his theory about the tails of comets (generally considered the most plausible of the many that have been advanced) on the *postulate* that the rays of the sun *could* carry with them, or propel the vapors, that compose the atmosphere of those bodies, to the distance, at least to which their tails are visible. The momentum of moving bodies is as the quantities of matter they contain, multiplied into their velocities. Then, although the particles of light may be incalculably small, yet their velocity, being so inconceivably great, as we know it to be, their momentum may be sufficient to produce very sensible effects. That such is the fact we know with certainty, at least in one case.

If the rays of light, from a circumscribed luminous body, fall on a particular part of the retina of the eye, they will, by their impetus on the nerves, so wound them, as partially to paralyze that part for a time, so that, if soon afterwards, the eye be directed to an object with a white surface from which light is reflected, that portion of light, which falls on the paralyzed part, will not produce the usual effect of vision, but represent, as a dark spot, that part of the object from which the light is reflected to it.

The difference of size between that of a particle of light and of a cannon ball, may *almost*, but cannot be *absolutely*, infinite.—The effects which either can produce are governed by the same law already quoted, that is, the quantity of matter in each multiplied by its velocity. If then a ball, discharged from a cannon, has an effect to propel whatsoever may be in its course, so has a ray of light; both are governed by the well known laws of moving bodies impinging on those that are at rest If the proportions between the one and the other are the same, the effect will be the same, differing only in degree. If then the sun-beams *can*, in passing through the moon's atmosphere, carry with them something contained in it to this earth, whether it be by elective attraction or by impulse, the theory that has been advanced respecting *the functions of the moon*, cannot be considered as absurd, or destitute of plausibility, to such a degree as not to claim for it a rational assent.

The tooth of time crumbles every thing into atoms, and the regenerating energies of nature constantly recompose them into organic bodies.

Every thing is under a process of dissolution and reorganization, although it may, in some subjects, be so slow as to require ages to make its effects visible, yet, in thousands of others, such effects are matters of daily observation; and this process cannot be thus unceasingly in operation without admitting the position that the atoms, aggregated in the various substances belonging to this earth, and probably, all that compose the universe, do, by their faculties of attraction and repulsion, and perhaps some others unknown to us, so operate as to produce the ultimate results for which those provisions of nature are made, and which we perceive in the origin, growth, maturity, decline and destruction of every thing about us, besides the many other wonderful phenomena we continually witness.

What produces magnetism, galvanism and electricity? apparently lifeless masses of matter—iron, silver, zinc, glass. It appears, prima facie, absurd to think that such bodies can, by a proper agency of the materials which compose them, produce any effect whatever, much less such powerful ones as those they do actually produce. Hence we are driven to the necessity of concluding that there is life in them, and that it is, by the combined agency of the particles of which they are composed, that such effects are produced.

While those bodies of matter are presented as absolutely dead masses, they contain the most active materials within them, working miracles as incapable of solution as the mysteries of eternity.

Under such a view of the constitution of the material creation, I cannot conceive that any substantial objection can be brought against the theory I have advanced, respecting the functions of the moon and her services to the earth.

But whether this theory be well sustained or not, it excites reflections which crowd so thick on the mind that language is incapable of giving them utterance. If it be true that nothing is created in vain, or to be mere inert, inoperative matter; if it be true that every thing acting as a cause, produces as great a number of effects as, from a constitution designed for the greatest possible good, it is capable of producing; and if we are warranted in saying that as far as our discoveries extend there appears to be a reciprocity of salutary effects and mutual services between all the agencies of material substances, may we not view the creation and every organized body it contains, nay, every imperceptible as well as perceptible atom belonging to it, as in a state of ceaseless activity, all engaged in executing the benevolent purposes of the Governor of the universe. It is true that many of them appear to be dormant, or perfectly lifeless until the appropriate exciting means rouse them into action, and then they exhibit their tremendous powers. Witness the degree of combustion, almost beyond credibility, produced by galvanism, and the destruction made by a stroke of lightning; and yet we know that all these have their salutary effects and are intended for the wisest purposes.

There is a relation between all, even the most distant worlds that float in the immensity of space, as well as between the parts of which they are composed. How wonderfully do those mysterious powers, the centrifugal and centripetal forces, control every

orb that rolls through the immensity of space, and confine it to the path traced for it by the finger of the Creator! What can we say of the attraction between worlds and worlds, as well as between the infinitely minute particles of matter that constitute this globe and every other part of the visible creation, and the wonderful results, but that such is the fiat of the Almighty, who can make a *sun-beam* the carrier of necessary restoratives between inhabitants of systems of millions of miles apart from each other. How do such considerations confound, and set at nought, all our endeavors to form adequate conceptions of the power and wisdom of the great incomprehensible Creator and Governor of the universe!

ART. VI. ASTRONOMICAL OBSERVATIONS *made at Berlin, Worcester County, Md. (February, 1831,) with some of their Results. By* STEPHEN ALEXANDER, A. M. *Tutor in the College of New-Jersey, Corresponding Member.*

Communicated, August, 1833.

Latitude of the place of observation, 38° 19′ N.
Approximate longitude of do. 75° 15′ W. of Greenwich.

As the eclipse of the 12th of February, 1831, would not be *annular* at any place in the state of New-York, I left Albany some days previous to that time, having determined to station myself at some point in the state of Maryland, as near as practicable to the path of the *centre* of the moon's penumbra.

Previous to my departure, I was kindly furnished, by his Excellency Gov. Throop, with a general letter of introduction, and by my friend Prof. Joslin, of Union College, with a valuable sextant, by Troughton, graduated upon platinum, and measuring tens of seconds. To the politeness of Mr. Edmund Blunt, of New-York city, I am also indebted for the loan of an excellent pocket chronometer, by Barraud. I procured likewise for the occasion, an achromatic telescope, which was mounted on a brass stand, and magnified about eighty times in diameter. To this list of instruments should also be added Fahrenheit's thermometer.

Availing myself of what information I could previously procure, and that which I obtained in the course of my journey, I finally selected for the place of observation the village of Berlin, in Worcester county. With considerable difficulty I succeeded in reaching that place on the evening of the 11th February.

Although the weather on the morning of the 12th, presented an appearance which seemed to indicate that the day would prove cloudy, yet this soon changed; and during the entire continuance of the eclipse, we were favored with a cloudless sky.

The times at which the principal phenomena took place, as indicated by the chronometer, were as follows—that instrument having been, originally, set to Greenwich time:

Beginning at . . .	4h.	48m.	13½s.
Formation of the ring,	6	22	35¾
Rupture of do.	6	24	21½
End	7	53	30

which reduced to mean time at the place, in accordance with observations made on that and several succeeding days, will be as follows:

Beginning at . . .	11h.	20m.	47s.70	A. M. civil reckoning.
Formation of the ring,	0	55	8.93	P. M.
Rupture of do.	0	56	51.66	
End	2	26	2.20	

The observation of the beginning was highly satisfactory; the breadth of the indentation of the Sun's limb when first noticed did not, as appeared to the eye, exceed a degree and a half or two degrees of the Sun's circumference; it consequently, could scarcely have been more than a second of a great circle in depth. A few minutes after, as the Moon advanced, its edge exhibited a remarkable prominence, not far from the middle of the arc then projected upon the Sun's disc. South of this prominence, and at no very great distance from it, an indentation of great breadth and very considerable depth, was soon afterwards discernible. These ragged appearances, as the Moon advanced, became quite numerous; some portions of her edge appearing very rough, especially near the south pole. This roughness was, however, almost entirely confined to the *eastern* half of the edge; the *western*, *except at the formation of the ring*, appeared remarkably smooth.

During the first hour of the eclipse, a small band of that part of the Sun's disc which bordered the edge of that of the Moon, appeared for some time, *brighter* than the remainder of the visible portion of the Sun. This appearance was even discernible with the small telescope attached to the sextant, to the eye-piece of which was affixed a dark glass, of a different tinge from that used with the larger telescope before mentioned.*

At times, also, the outline of the Moon's disc seemed to be continued for some short distance beyond the Sun's limb, thus showing the position of some portions of the Moon's edge not yet advanced in front of the Sun. This appearance was, however, by no means decisive, and was, at the time, attributed to some ocular deception. A similar phenomenon was, however, noticed, by at least two observers, at different places in Great Britain, during

* A similar phenomenon, but of a much more decided character, as well as beautiful appearance, was visible at Albany, during the transit of Mercury, May 5th, 1832, whenever I could obtain a view of the planet through thin, though dark flying clouds. Its breadth was about one-sixth of the diameter of Mercury.

the eclipse of September 7th, 1820, at a time when the Sun was obscured to nearly the same extent.*

But by far the most elegant, as well as decisive appearance of this kind, was exhibited immediately previous to the formation of the ring. While the bright cusps of the visible portion of the Sun's disc were still at some distance from each other, all the intervening portion of the Moon's dark limb was seen fringed with a tinge of light of surprising brilliancy; soon after which the distinct border of the Sun emerged.† The time at which this appearance first presented itself was not noted, the formation of the ring being momentarily expected, but the distance between the cusps, it is believed, was not less than one-fourth of the Sun's diameter; whence it would seem to have taken place at a little less than two seconds previous to the time of their meeting, when the disc of the Moon still projected beyond that of the Sun $0''\frac{2}{3}$. The bright cusps united with great rapidity, presenting as they emerged from the Moon's edge, an irregular serrated appearance.

At the rupture of the ring, a very small portion of the rough eastern edge of the Moon's disc first touched that of the Sun, and almost at the same instant, a similar contact took place, north of the first; a narrow, ragged, but most beautifully brilliant fragment of about 25 degrees of the Sun's circumference in length, being thus entirely separated from the remainder of the visible portion of the Sun's disc.‡ This interesting phenomenon, however, was necessarily of very short duration, entirely disappearing in the course of a very few seconds. The ring, to the bare eye, (even when viewing it through a very small aperture,) presented a much broader appearance than when viewed through the telescope.

The observation of the end was not entirely satisfactory; its accuracy is, therefore, less probable than that of the other observations.

During the progress of the eclipse, a gradual, but very sensible diminution of light took place, and the atmosphere, in consequence, became of a deeper and more dusky hue. The planet Venus was distinctly discernible when the Sun was about nine digits eclipsed, and when the obscuration became greater, Jupiter was also seen.

The diminution of temperature was also very sensible, and

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* See Edinburgh Philosophical Journal, vol. iii. p. 392; and (London) Quarterly Journal of Science, Literature and the Arts, vol. xi.

† See plate IV, fig. 1. ‡ See plate IV, fig. 3.

to the feelings quite unpleasant. The thermometer was suspended on the northwest side of a building, and sheltered from the direct influence of the strong northwest wind, which prevailed at the time. It stood, a few minutes after the beginning of the eclipse had been noted, at 38, shortly after the rupture of the ring at 30, and after the end at 33½ degrees, and during the remainder of the afternoon was not observed to rise.

The eclipse was annular at Georgetown, (Delaware,) but was not so at Milford in the same state. From the account given me by an intelligent gentleman, residing at the latter place, who observed with a darkened glass, it would seem that, at the greatest obscuration, the distance of the cusps amounted to about one-fourth of the Sun's diameter; the northern limit of the annular eclipse must, therefore, have probably extended to a point not far from a mile to the southeast of that place.

The tinge of light before spoken of as immediately preceding the formation of the ring, although frequently observed to occur in cases of this kind, has, yet, it would seem, been far from uniform, either in its extent or intensity. The same remark applies to the very similar phenomenon which usually, if not uniformly, accompanies a *total* eclipse of the Sun; but appears in that case some short time before the *termination* of total darkness, when the relative position of the western limbs of the Sun and Moon is nearly the same as in the former case. The truth of these remarks will plainly appear from the following instances:

The annular eclipse of February 18th, 1737, O. S. was observed at Edinburgh by Maclaurin and Short. In his account of their observations, Mr. Maclaurin remarks:

"A little before the annulus was complete, a remarkable point or speck of pale light appeared near the middle of the part of the Moon's circumference that was not yet come upon the Sun's disk; and a gleam of light, more faint than this point, seemed to be extended from it to each horn. Mr. M. did not mark the precise time when he first perceived this light, but is satisfied that it could not be less *than one-fourth of a minute before the annular appearance began.* Mr. Short, who was in another chamber at some distance, and made use of a larger telescope, said that he saw it 20 *seconds before the annulus was completed.*"*

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* Philosophical Transactions, (abridged) vol. viii. p. 169, et. seq.; or vol. xl. p. 177, et seq. of the original work.

From this account it is evident that at the time when the "gleam of light" first appeared, the edge of the Moon's disc (making no allowance for the inequalities of her surface.) must have projected several seconds of a degree beyond that of the Sun; and, as the duration of the ring was, in this case, nearly six minutes, the ring must necessarily have been uncommonly broad; a considerable portion of the Sun must, therefore, at that time have been uneclipsed, and the quantity of light very considerable.*

M. Le Monnier, (the French Astronomer Royal,) Mr. Short, F. R. S. and the Earl of Morton, observed the eclipse of July 25th, 1748, N. S. at Aberdour castle, (belonging to the Earl,) near Edinburgh. In Mr. Short's account of their observations, it is stated, that

"The eclipse was so nearly annular, that at the nearest approach the cusps seemed *to want about one-seventh of the moon's circumference to be joined; yet a brown light was plainly observed to proceed or stretch along the circumference of the moon, from each of the cusps, about one-third of the whole distance of the cusps from each cusp, and there remained about one-third of the whole distance of the cusps not enlightened by this brown light;* so that they were for some time in suspense whether they were to have the eclipse annular."

In a subsequent part of the same account, it is mentioned, that "Mr. Le Monnier measured with the micrometer," attached to his telescope, "the apparent equatorial diameter of the moon, when she was on the sun; which he found=29′ 47″½. He measured also the apparent vertical diameter of the sun at noon; which he found = 31′ 40″." †

If the result last mentioned be corrected for refraction, and from one half the remainder 3″ be subtracted for irradiation, it will be found, by a process of computation which need not here be detailed, that the distance from the nearest limb of the Sun, of either point of the Moon's limb, at which the "brown light" ceased to be visible, (measured in the direction of the radius of the Sun's disc which, produced, would pass through that point,) was 4″885, the sun and moon being supposed to be perfect spheres.

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* The Sun's semidiameter, diminished 3½″ for irradiation, was about 16′ 6″, and the Moon's horizontal semidiameter, diminished 1½″, was about 14′ 38″.

† Philosophical Transactions, (abridged,) vol. ix. p. 591, et seq.; or vol. xlv. p. 582 of the original work.

The ring appears to have been somewhat broader in this than in the former case.

It should here be mentioned, as a remarkable fact, that a similar tinge of light was seen to extend, for some distance along the disc of the Moon, by M. Cassini de Thury, who observed this eclipse, in company with the King of France, at Compeigne; although at the greatest obscuration, when this took place, the Sun was but $9\frac{1}{2}$ digits eclipsed.*

The annular eclipses of 1791 and 1811 were observed in this country; but no appearance similar to that now under consideration seems to have been noticed.

Among the accounts given of observations of the *total eclipse* of 1706, in the (London) Philosophical Transactions, are the following remarks, extracted from the Leipsic Acts of the Learned.

"There was scarcely one-third part of the sun's disc uneclipsed; † and several fixed stars, with the planets mercury, venus, jupiter, and saturn, were visible. A shining ring was also observed, surrounding the moon, *parallel to its limb*; it was denser in that part towards the moon, and rarer in that part which was farthest from it; but it was nevertheless bounded by a very accurate periphery, and plainly to be distinguished from the uneclipsed part of the sun which was above it, toward the zenith. It was less than the uneclipsed portion of the sun's disc, and its brightness was like that of silver. The edge of the moon was pale like clouds, whilst the inner part of the disc was quite black."

Capt. Stannyan, who observed this eclipse at Bern, in Switzerland, where it was total, noticed, that

The sun's "*getting out of the eclipse was preceded by a blood-red streak of light from its left limb, which continued not longer than six or seven seconds of time.*"

Mr. J. C. Facis Duillier, F. R. S. who saw the eclipse at Geneva, observed, that "during the time of the total darkness, a whiteness seemed to break out from behind the moon, and to encompass it on all sides equally, its breadth being less than one-twelfth of the moon's diameter.‡"

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* See an interesting paper on the solar eclipse of Sept. 7th, 1820, by Francis Baily, Esq. in the Annals of Philosophy.

† By this it would seem to be intended that the *length* of the uneclipsed portion of the sun's disc, was about *one-third of the sun's circumference.* Its extreme breadth would of course be very small.

‡ Philosophical Transactions, (abridged,) vol. v. p. 296 to 298; or vol. xxv. p. 2241 of the original work.

Dr. Halley, in his "Observations on the total eclipse of the sun of April 22d, 1715," O. S., after describing an appearance similar to that last mentioned, thus continues:

"During the whole of the time of the total eclipse, I kept my telescope constantly fixed on the moon, to observe what might occur in this uncommon appearance; and I found that there were perpetual flashes or coruscations of light, which seemed, for a moment, to dart out from behind the moon, on all sides, but more especially on the western side, a little before the emersion: *and about two or three seconds before it, on the same western side,* where the sun was just coming out, *a long and very narrow streak, of a dusky, but strong red light, seemed to colour the dark edge of the moon; though nothing like it had been seen immediately after the immersion. But this instantly vanished, on the first appearance of the sun, as did also the aforesaid luminous ring.*"*

The eclipse of June 24th, 1778, was observed at sea by the Spanish admiral, Don Antonio Ulloa. Among other peculiarly interesting phenomena, he noted the following:

"*Five or six seconds after the immersion, he began to observe round the moon a very brilliant circle of light, which seemed to have a rapid circular motion, something similar to that of a rocket turning about its centre. This light became livelier and more dazzling in proportion as the centre of the moon approached that of the sun;* and about the middle of the eclipse it was of the breadth of about a sixth of the moon's diameter. Out of this luminous circle there issued forth rays of light, that reached to the distance of a diameter of the moon, sometimes more, sometimes less, which made him think that they were parts of a weaker light, reflected in an atmosphere more subtle than that in which the ring was formed. *When the centres of the two planets began to separate, the diminution began,* and took place gradually, in the same order which had been observed at its beginning, and during the progress of it. *It disappeared entirely four or five seconds before the emersion.*"

This light, as appears from a subsequent part of the same account, exhibited some variety of colour, and "was uniformly brilliant throughout." It is also stated, that

"For four or five seconds before the appearance of the shining ring, and during as many after it disappeared, they could see stars

* See Philosophical Transactions, (abridged,) vol. vi. p. 155, et seq.; or vol. xxix. p. 245 et. seq. of the original work.

of *the first and second magnitude*, as at the entrance of night; but when it was at its greatest degree of brilliancy, only those of *the first magnitude could be discovered.*"*

Prof. Williams observed an eclipse of the sun on the 27th of October, 1780. His observation was made at Long-Island, in Penobscot Bay. The eclipse was so nearly total, that at the greatest obscuration "he found almost the whole of the lucid part (of the sun) broken or separated into drops, a small part only, in the middle, remaining connected;" yet he does not seem to have noticed any light surrounding the dark body of the moon.†

The phenomena observed in this country during the total eclipse of 1806, appear to have been very similar to those already mentioned, as having been observed by Dr. Halley during that of 1715. The brightness of the moon's edge, as observed at Albany by Simeon De Witt, Esq. Surveyor-General of the state of New-York, seems to have been fully equal to that before spoken of as occurring during the eclipse of 1706.‡

Of the phenomena mentioned in the preceding observations, and the quotations which follow, the faint ring of light which seems uniformly to have surrounded the Moon during a total eclipse of the Sun, may possibly depend upon the same cause which produces the peculiar tinge which in that case borders the edge of the moon immediately before the end of total darkness, and which also, (or something similar,) in most of the annular eclipses already referred to would seem to have preceded the formation of the ring. Its intensity is, however, evidently less than that of the last mentioned phenomenon, as appears from the fact that, where the eclipse was nearly central, it has not, in any known case, been seen for more than a very few seconds before or after the total darkness; and, where the total darkness was of short duration, or even where the eclipse was not quite total, it is not known to have been seen, except during such time as the uneclipsed portion of the Sun was very minute. The blood-red tinge, also, which precedes the end

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* See Philosophical Transactions, (abridged,) vol. xiv. p. 495, et seq.; or vol. lix. p. 105, et seq. of the original work.

† See Memoirs of the American Academy, vol. i. p. 93.

‡ See the account of his observations, as well as those of J. J. De Ferrer, in the American Philosophical Transactions, vol. vi. A drawing which was presented by Mr. De Witt to the Institute, and which represents the appearance of the moon as seen by him on the occasion here spoken of, now adorns the room of the second department.

of total darkness seems scarcely to have endured for an instant after the beginning of the Sun's emersion.

On the contrary, the light joining the cusps of the uneclipsed portion of the Sun's disc in the other instances, (in which the eclipse was annular, *or when, had it been sufficiently near to central it would have been annular,*) exhibited itself at a time when a considerable portion of the Sun's disc was uncovered. The variety, which in this respect its several appearances have presented, is, also, not unworthy of notice. It moreover deserves particular attention that it has, as yet, (from all that appears in any of the above mentioned instances) been seen to border only the *western* or *southern* limb of the Moon, but not in any case its *eastern*. The same remark will also apply to the blood-red tinge of light in the case of either of the total eclipses in which it was noticed; whereas, the fainter gleam of light, which appeared during the existence of this latter phenomenon, encircled the whole of the Moon's disc; being, according to some observers, concentric with it, and, according to others, concentric with that of the Sun.

These phenomena, although they present a subject for investigation at once curious and interesting, seem not as yet to have been observed with all that care which is requisite in order that their investigation may lead to results which shall be, to any considerable extent, satisfactory. It is therefore respectfully suggested, that the favorable opportunities presented to the observers of this country, who may be permitted to witness the total eclipse of 1834, or the extensively annular eclipse of 1838,* should not be suffered to pass unimproved. The *time at which any peculiar phenomenon of the kind in question may first appear, should be carefully noted, as also the time of its disappearance, and the distance of the cusps of the uneclipsed portion of the Sun's disc, (at each of these periods) should any part of it then be exposed; and, should any part of the solar disc be seen entirely separated from he rest (especially if its edge remain well defined) then the time during which this appearance lasts should also be noted,* as affording a datum for the computation of the height of the lunar mountains, such, as has very seldom been used for that purpose.

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* See Mr. Paine's catalogue of eclipses, in the American Almanac for 1831.

ADDITIONAL OBSERVATIONS.

I. Observations for ascertaining the Apparent Time, and the Rate of the Chronometer.

February 12*th.*

Equal altitudes of sun were observed at $\left\{\begin{matrix}3\text{h. }46\text{m. }55\frac{1}{2}\text{s.}\\7\ \ 37\ \ 30\frac{1}{2}\end{matrix}\right\}$ and $\left\{\begin{matrix}3\text{h. }59\text{m. }59\frac{1}{2}\text{s.}\\7\ \ 24\ \ 29\end{matrix}\right\}$ by chronometer.

2)	11	24	26	11	24 $28\frac{1}{2}$
	5	42	13.000	5	42 14.250
Equation of eq. alt.			13.294		13.256
	5	41	59.706	5	42 0.994
		42	0.994		
2)	84		0.700		
Mean	5	42	0.350	at apparent noon.	
Mean time . . .	0	14	33.969	at do.	
Chronometer too fast	5	27	26.381	at do.	

February 13*th.*

Equal altitudes of the sun were observed at,

	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.
	3 35 $54\frac{1}{2}$	3 41 34	3 45 $29\frac{1}{2}$	3 48 $28\frac{1}{4}$	3 55 $18\frac{3}{4}$
	7 49 $3\frac{3}{4}$	7 43 $19\frac{1}{2}$	7 39 28	7 36 27	7 29 40
2)	11 24 58.25	11 24 53.5	11 24 57.5	11 24 55.75	11 24 58.75
	5 42 29.125	5 42 26.75	5 42 28.75	5 42 27.875	5 42 29.375
Eq.	13.41	13.392	13.379	13.367	13.348
	15.715 = d	13.358 = a	15.371 = c	14.508 = b	16.027 = e

$\left\{\begin{matrix}3\text{h. }59\text{m. }37\frac{1}{4}\text{s.}\\7\ \ 25\ \ 27\end{matrix}\right\}$

2) 11 25 4.75

5 42 32.375 (rejected.)

a = 13.358
$2b$ = 29.016
$2c$ = 30.742
$2d$ = 31.430
e = 16.027

8) 120.573

5h. 42m. 15s.071 + at app. noon.
Mean time . . . . 14 33 .103 at do.
Chronometer too fast, 5 27 41 .968 at do.

February 17*th.*

Time by chronometer.	App. alt. of ☉'s lower limb.	Time by chron.
2h. 35m. $5\frac{1}{4}$s.	22° 55′ 22″	8h. 51m. $30\frac{1}{4}$s.
49 55	25 8 8	8 36 $40\frac{1}{4}$
3 6 18	27 27 54	
13 $20\frac{1}{4}$	28 23 52	
34 36	31 5 14	
50 $28\frac{1}{4}$	32 53 24	7 36 7

Results of equal altitudes.

	Middle time.		
	5h. 43m. 18s.	5h. 43m. 17s.625	5h. 43m. 17s.75
Eq.	—14 .008	—13 .905	—13 .598
	3 .992=b	3 ,720=a	4 .152=c.
			7 .984=$2b$.
			3 .720=a.
			4)15 .856

Mean . . . . . 5h. 43m. 3s.964 at app. noon.
Mean time . . . 0 14 21 .397 at do

Chronometer too fast 5 28 42 .567 at do

Results of single altitudes. (Temperature 47°.)

Time by chronometer,	2h. 35m. 5s.25	2h. 49m. 55s.	3h. 6m 18s.
Mean time, . . .	9 6 24 .062	9 21 14 .932	9 37 44 .522
Chronometer too fast,	5 28 41 .188	5 28 40 068	5 28 33 .478

Time by chronometer,	3h. 13m. 20s.25	3h 34m. 36s.	3h 50m 28s.5
Mean time, . . .	9 44 39 .545	10 5 57 .254	10 21 47 .058
Chronometer too fast,	5 28 40 .705	5 28 38 .746	5 28 41 .442

Chronometer too fast. Mean time.
Mean, (rejecting the 3d observation,) 5h. 28 m. 40s. 514 at 9h. 44m. A. M.

February 18*th.*

Times by chron.	App. alt. of ☉'s lower limb.	Results in mean time.
I. 3h. 18m. 21¼s.	29° 20′ 30″	9h. 49m. 30s.530
II. 24 22¼	30 0 38	54 41 .842
III. 30 10½	30 50 25	10 11 19 .738
IV. 40 54½	31 58 3	10 43 .904

Chronometer too fast. (Temperature 52°.)

I.	5h. 28m. 50s.720
II.	5 29 40 .908
III.	5 28 50 .512
IV.	5 30 10 .596

Mean, (rejecting the 2d and 4th observations,)
5h. 28m. 50s.616 at 10h. 0m. 25s. mean time A. M.

February 19*th*

Time by chronom.	App. alt. of ☉'s lower limb.	Time by chronom.
2h. 13m. 18¼s.	19° 59′ 37″	9h. 13m. 49s.
28 8¾	22 21 36	8 59 49¾
43 55¾	24 46 41	43 4¼
57 18¾	26 44 41	29 36¼
3 10 40¼	28 35 44	16 21¼
28 56¼	30 58 51	

Results of equal altitudes.

	Middle time.			
	5h 43m 33s.667	5h 44m 29s.250 (rejected.)	5h 43m 30s.250	5h 43m 27s. 291
Eq.	—14 .313		—14 .057	—13 .963
	19 .354		16 .193	13 .328
			19 .354	
	5h. 43m. 31s.000		13 .328	
	—13 .879		17 .121	
	17 .121		4) 65 .996	

Brought forward, 4) 65 .996

Mean . . . . . 5h. 43m. 16 .499 at app. noon.
Mean time . . . 0 14 11 .230 at do.

Chronometer too fast, 5 29 5 .269 at do.

Results of single altitudes. (Temperature 52°.)

Time by chronometer,	2h. 13m. 18s.333	2h. 28m. 8s.75	2h. 43m. 55s.75
Mean time, . . .	8 44 13 .820	8 59 3 .919	9 14 51 .366
Chronometer too fast,	5 29 4 .513	5 29 4 .831	5 29 4 .384
Time by chronometer,	2h. 57m. 18s.333	3h. 10m. 40s.250	3h. 28m. 56s.250
Mean time, . . .	9 28 17 .945	9 41 34 .904	9 59 54 .476
Chronometer too fast,	5 29 0 .388	5 29 5 .346	5 29 1 .774

Mean, 5h. 29m. 3s.539 at 9h. 21m. 19s.

February 21*st.*

Times by chronom.	App. altitude ☉'s lower limb.	Times by chronom.
3h. 50m. 48¼s.	34° 8′ 46″	7h. 36m. 37¼s.
58 36½	34 59 2	29 3½
4 4 18¼	35 34 7	23 9¼
27 12	37 37 58	

Results of equal altitudes.

	Middle time.	
5h. 43m. 42s.875	5h. 43m. 49s.875 (rejected.)	5h. 43m. 43s.750
—13 .729		—13 .674
5 43 29 .146		5 43 30 .076
		29 .146
		2) 59 .222
	Mean, ...	5 43 29 .611 at app. N.
	Mean time	0 13 58 .129 at do.
	Chronometer too fast,	5 29 31 .482 at do.

Results of single altitudes. (Temperature 37°.)

	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Time by chron.	3 50 48.250	3 58 36.500	4 4 18.250	4 27 12.000
Mean time, .	10 21 15.367	10 29 3.092	10 34 46.491	10 57 40.691
Chron. too fast.	5 29 32.883	5 29 33.408	5 29 31.759	5 29 31.309

Mean. Chronometer too fast, 5h. 29m. 32s.340 at 10h. 35m. 41s. mean time A. M.

RECAPITULATION AND COMPARISON OF FINAL RESULTS.

Chronometer too fast:

By equal altitudes.

At app. N. 12th, 5h. 27m. 26s.381
" 13th, 5 27 41 .968
" 17th, 5 28 42 .567
" 19th, 5 29 5 .269
" 21st, 5 29 31 .482

By single altitudes.

At app. N. 17th, 5h. 28m. 41s.557
" 19th, 5 29 5 .134
" 21st, 5 29 33 .293

Mean Daily Rate of Chronometer.

	By equal altitudes.		By single altitudes.	
From the	12th to the 13th,	15s.587	17th to 18th,	9s.983
	13th to 17th,	15 .150	17th to 19th,	11 .636
	17th to 19th,	11 .476	18th to 19th,	13 .284
	19th to 21st,	14 .749	19th to 21st,	14 .035

Occultations.

		Time by Chron.	Time corrected.
Feb. 19th.	Immersion of 1θ Tauri,	0h. 39m. 59s.$\frac{1}{4}$	7h. 10m. 50s.44 P. M.
	" 2θ Tauri,	0 58 56 $\frac{1}{4}$	29 47 .78
	Emersion of do.	1 46 23 $\frac{1}{4}$	8 17 14 .38
Feb. 20th.	Emersion of Aldebaran,	5 32 41 $\frac{1}{4}$	0 3 30 .46 A. M.

Observations for determining the Latitude.

	Feb. 17*th.* Temp. 47°	*Feb.* 18*th.* Temp. 37°	*Feb.* 19*th.* Temp. 52°	*Feb.* 21*st.* Temp. 37°
Twice app. mer. alt. of the ☉'s low. limb, 2)	78° 44′ 22″	79° 25′ 58″	80° 9′ 10″	81° 35′ 12″
	39 22 11	39 42 59	40 4 35	40 47 36
Refraction, . . .	—1 10.87	—1 11.40	—1 8.42	—1 8.75
	39 21 0.13	39 41 47.60	40 3 26.58	40 46 27.25
Parallax, ...	6.71	6.68	6.64	6.56
Semi-diameter, . .	16 12.36	16 12.15	16 11.90	16 11.46
Declination S. . .	12 3 21.37	11 42 17.93	11 21 3.46	10 38 3.39
Alt. of the equator, .	51 40 40.57	51 40 24.36	51 40 48.58	51 40 48.66
Latitude, ...	38 19 19.43	38 19 35.64	38 19 11.42	38 19 11.34
				11.42
				35.64
				19.43
				4) 77.83
			Mean,	38 19 19.46

for the latitude of Mr. Sturgis's hotel, at which the observations were taken. To the uniformly polite attention and assistance rendered me by this gentleman, as well as others at that place, I feel myself much indebted.

Figures 1st and 3d of the annexed plate have already been referred to in their proper places. Fig. 2d represents the appearance of the Sun when the ring was most perfect.

Art. VII. *Report of the Committee appointed to continue the* Meteorological Observations, *on the 21st of June, September, December and March.*

Accepted May 5, 1836.

In presenting to the Institute the following tables, as worthy of publication in the pages of its Transactions, your committee believe that the following brief account of their origin will not be deemed inappropriate.

In the autumn of 1834, the South African Literary and Philosophical Institution appointed a meteorological committee, who presented a report prepared by Sir John Herschel, embracing instructions for the observing and recording meteorological phenomena in South Africa,* from which the following is an extract:

"With a view to the better determining the laws of the diurnal changes taking place in the atmosphere, and to the obtaining a knowledge of the correspondence of its movements and affections over great regions of the earth's surface, or even over the whole globe, the committee have resolved to recommend, that four days in each year should henceforth be especially set apart by meteorologists in every part of the world, and devoted to a most scrupulous and accurate registry of the state of the barometer and thermometer, the direction and force of the wind, the quantity, character and distribution of clouds, and every other particular of weather, throughout the whole 24 hours of those days and the adjoining six hours of the days preceding and following. The days they have been induced to fix on and recommend for these observations, are, the 21st of March, the 21st of June, the 21st of September, and the 21st of December, being those, or immediately adjoining to those, of the equinoxes and solstices, in which the solar influence is either stationary, or in a state of most rapid variation. *But should any one of those 21st days fall on*

* An edition of this report was printed for private distribution in England, by Henry Beaufoy, Esq. F. R. S., and it has also been reprinted in the Zodiac, a monthly paper published in this city.

Sunday, then it will be understood that the observations are to be deferred till the next day, the 22nd. The observation at each station should commence at 6 o'clock A. M. of the appointed days, and terminate at 6 o'clock P. M. of the days following, according to the usual reckoning of time at the place. During this interval, the barometer and thermometer should be read off and registered hourly, or at all events, at intervals not more than two hours asunder, and the precise hour and *minute* of each reading should be especially noted.

"For obvious reasons, however, the commencement of every hour should, if practicable, be chosen, and every such series of observations should be accompanied by a notice of the means used to obtain the time, and, when practicable, by some observation of an astronomical nature, by which the time can be independently ascertained within a minute or two. As there is scarcely any class of observations by which meteorology can be more extensively and essentially promoted, it is hoped that not only at every section of importance in this colony, but over the whole world, and on board ships in every part of the ocean, individuals will be found to co-operate in this inquiry."

This recommendation was followed by Mr. Roberton, of the Royal Society of London, whose observations for the 22d of June, and 21st of September and December, 1835, are recorded in the first three tables. They are copied from the London Atheneum. A committee of the Institute commenced similar observations in December, and tables 4 and 5 contain the record of the 21st and 22d of December and March. For the purpose of making this design generally known, these tables were published in the Albany Daily Advertiser, and also on a separate sheet, and sent to every person whom the committee knew to be engaged in meteorological observations. At the same time, John S. McCord, Esquire, Vice-President of the Natural History Society of Montreal, and a corresponding member of the Institute, at the request of an officer of the Hydrographical Corps, commenced similar observations in that city, the results of which, for December and March, are given

in tables 6 and 7, which he has kindly sent to the Institute. The publication of our tables has induced Prof. Gill of Flushing, L. I., Prof. Smith of the Wesleyan University, at Middletown, Conn., Prof. Locke of Cincinnati, Ohio, and Prof. Joslin of Schenectady, to unite in making contemporaneous observations, of which those by the three first named gentlemen are contained in tables 8, 9, and 10. Professor Gill's observations have also been published in the Mathematical Miscellany, Prof. Smith's in the Middletown Sentinel, and Prof. Locke's in the Western Monthly Magazine. Professor Joslin's observations have not as yet been published.

The committee have appended to these tables a diagram, representing the variations of the barometer on the 21st and 22d of March, at Flushing, Middletown, Albany, Montreal and Cincinnati, in which the variation of each observation from the mean of the 37, is measured on the line corresponding to the hour, and these points united by straight lines.

MATTHEW HENRY WEBSTER,
PHILIP TEN EYCK,
JOHN V. L. PRUYN,
HORACE B. WEBSTER,
Committee.

The committee earnestly request all who may hereafter take similar observations, to communicate them to the Institute, as it is intended to publish a Number of the Transactions every three months, containing all the observations made on this Continent, which may be received.

TABLE I.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Royal Society, Somerset House, London, for 37 successive hours, commencing 6 A. M. of the 22d June, 1835, and ending 6 P. M. of the following day. (Greenwich mean time.)

Lat. 51° 30′ 49″ *N.; Long.* 0° 5′ 47″ *W.*

By Mr. J. D. Roberton, Assistant Secretary Royal Society.

The hours of observ.	Barometer corrected.	Attached Ther.	External Ther.	Rain in inches.	Wind.	REMARKS.
6 A. M.	29.865	65°9	60°8	....	SW	Lightly overcast; light wind.
7	29.873	66 2	61 7	....	"	" "
8	29.865	66 5	62 5	....	"	" "
9	29.853	67 7	65 2	....	"	" "
10	29.839	68 4	66 3	....	"	Fine; light clouds and wind.
11	29.835	69 0	66 9	....	"	" " "
12	29.810	69 7	69 0	....	"	" " light brisk wind.
1 P. M.	29.796	69 8	71 9	....	"	" " "
2	29.782	70 3	72 6	....	"	" " "
3	29.768	70 5	72 4	....	"	" " "
4	29.759	70 7	71 4	....	"	" " "
5	29.750	70 9	69 4	....	"	Cloudy; light wind.
6	29.736	70 5	67 4	....	"	Fine; light clouds and wind.
7	29.730	69 8	65 2	....	S var.	" " high wind.
8	29.724	69 2	68 0	....	"	Cloudy; "
9	29.716	67 9	61 2	....	"	" " "
10	29.707	67 5	60 8	....	"	" " "
11	29.699	66 7	61 2	....	"	" " "
12	29.680	66 7	60 7	....	"	" " "
1 A. M.	29.655	66 2	59 6	....	"	Overcast; "
2	29.645	66 2	59 4	....	"	" " [very high wind.
3	29.625	66 2	59 0	....	WSW	" 2½ A. M. heavy rain with
4	29.635	65 9	57 6	....	SW	" continued rain and wind.
5	29.641	66 6	55 7	....	S var.	" " "
6	29.639	64 9	54 7	....	SW	" " "
7	29.649	64 6	56 3	....	WSW	Fine; light clouds and wind.
8	29.671	66 6	61 7	....	SW	" " "
9	29.681	69 2	62 8	.391	"	" " "
10	29.693	70 4	64 6	....	S var.	" " "
11	29.701	70 3	64 6	....	SW	" " "
12	29.699	70 2	64 4	...	WSW	" " "
1 P. M.	29.699	69 6	66 2	....	"	" " "
2	29.709	69 6	65 9	....	"	" " "
3	29.724	69 4	65 3	....	SW var.	" " "
4	29.718	69 0	65 7	....	SW	" " "
5	29.728	68 7	62 6	....	W	Lightly cloudy; light shower.
6	29.734	68 0	61 8	....	WSW	Fine; light clouds.
Mean.	29.731	68 3	63 9	.391		

The standard barometer of the Royal Society is described in Daniell's Meteorological Essays. Height of cistern of barometer above the presumed mean level of the sea, 95 feet. External thermometer is two feet higher than barometer cistern. Height of receiver of rain guage above the court of Somerset House, 79 feet.

TABLE II.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Royal Society, Somerset House, London, for 37 *successive hours, commencing* 6 *A. M. of the* 21*st of September,* 1835, *and ending* 6 *P. M. of the following day. (Greenwich mean time.)*

Lat. 51° 30′ 49″ *N.; Long.* 0° 5′ 47″ *W.*

By Mr. J. D. Roberton, Assistant Secretary Royal Society.

The hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Rain in inches.	Wind.	REMARKS.
6 A. M.	29.887	60°7	55°7	....	S	Cloudy; light wind.
7	29.901	61 2	56 8	....	"	" "
8	29.881	61 6	57 9	....	"	" light fog and wind.
9	29.897	62 2	59 5	....	"	Overcast; very light rain and wind.
10	29.905	62 6	60 2	....	SE	" light continued rain & wind.
11	29.879	62 8	59 7	....	ESE	" " "
12	29.885	63 2	58 4	.075	E	" " "
1 P. M.	29.857	63 3	57 6	.030	SE var.	" " "
2	29.853	62 8	56 9	....	E	" "
3	29.816	62 6	56 3	.125	"	" " "
4	29.812	62 2	55 3	....	"	" "
5	29.810	61 7	55 2	.080	"	" "
6	29.784	61 3	54 7	....	"	" " "
7	29.788	60 8	54 8	....	"	" light wind and rain.
8	29.792	60 7	55 2	....	"	" "
9	29.788	60 8	55 6	.030	"	" "
10	29.780	61 3	55 6	....	"	" "
11	29.776	61 2	55 4	....	"	" "
12	29.764	61 0	55 4	....	"	" "
1 A. M.	29.740	60 6	55 8	....	"	" "
2	29.722	60 6	56 2	....	"	" "
3	29.701	60 8	56 6	....	"	" "
4	29.673	60 8	57 0	....	"	" "
5	29.641	60 8	57 8	....	"	" "
6	29.614	61 3	58 8	....	"	" deposition; light wind.
7	29.598	61 6	60 2	....	"	Fine and cloudless; "
8	29.596	62 8	62 4	....	SE var.	" light clouds and wind.
9	29.572	64 3	64 4	...	E	" nearly cloudless; light brisk wind.
10	29.567	64 8	66 2	...	SE var.	" light clouds and brisk wind.
11	29.552	65 4	67 3	....	SE	" " "
12	29.538	65 6	68 3	....	ESE	" " "
1 P. M.	29.530	66 0	68 2	....	SE	" " wind.
2	29.526	66 3	67 7	....	SE var.	Cloudy; light brisk wind.
3	29.501	66 4	68 0	....	NE var.	" high wind.
4	29.499	66 4	68 2	..	S var.	" "
5	29.507	66 0	66 7	....	NE var.	Overcast; "
6	29.509	66 2	65 7	....	SE var.	" "
Mean.	29.715	62°7	59°8	.340		

TABLE III.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Royal Society, Somerset House, London, for 37 *successive hours, commencing* 6 *A. M. of the* 21*st of December,* 1835, *and ending* 6 *P. M. of the following day.* (*Greenwich mean time.*)

Lat. 51° 30′ 49″ *N.; Long.* 0° 5′ 47″ *W.*

By Mr. J. D. Roberton, Assistant Secretary Royal Society.

The hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Rain in inches.	Wind.	REMARKS.
6 A. M.	29.934	36°3	32°7	....	NW	Cloudy; light wind.
7	29.952	36 3	32 7	....	W var.	" "
8	29.962	36 2	32 8	....	NE	" "
9	29.978	36 2	32 5	....	NE	" "
10	30.000	36 3	32 6	....	N	" "
11	29.998	36 3	32 8	....	N	" "
12	29.994	36 0	33 4	....	NW	Lightly cloudy; light wind.
1 P. M.	29.988	36 0	33 0	...	NW	Fine and cloudless; light brisk wind.
2	29.994	36 2	33 2	....	NE var.	" "
3	30.006	36 3	32 6	....	NE	" "
4	30.014	36 3	31 6	....	NE	" "
5	30.027	36 0	30 7	....	NE	Fine; light clouds; light wind.
6	30.035	36 2	30 3	....	NE	" "
7	30.033	35 9	29 3	....	.....	" "
8	30.045	35 8	29 3	....	.....	" "
9	30.065	35 7	29 2	....	.....	" "
10	30.080	35 6	29 3	....	.....	Fine and clear; light brisk wind.
11	30.087	35 6	29 3	....	.....	" "
12	30.092	35 5	29 2	....	.....	" "
1 A. M.	30.099	35 6	28 5	....	.....	" "
2	30.099	35 5	28 2	....	.....	" "
3	30.103	35 4	27 4	....	.....	" "
4	30.117	35 3	27 4	....	.....	" "
5	30.122	35 2	27 6	....	.... ..	" "
6	30.134	34 9	27 6	....	.....	" "
7	30.154	34 8	27 7	....	NE	" "
8	30.178	34 7	27 7	....	NE	" "
9	30.198	34 6	28 8	....	NW var.	" "
10	30.216	34 7	29 9	....	NE	" light fog and wind.
11	30.231	34 7	31 9	....	NW	Fine; light clouds, with light brisk wind
12	30.233	34 7	33 5	....	NW	" " "
1 P. M.	30.239	34 8	35 2	...	NW	" " "
2	30.247	35 0	36 2	....	NE var.	" " "
3	30.263	35 2	36 3	....	ENE	Fine and clear; light brisk wind,
4	30.287	35 5	35 2	....	N	" "
5	30.299	35 4	34 0	....	NE	" "
6	30.311	35 6	32 8	....	NE	" "
Mean.	30.103	35°6	31°1			

TABLE IV.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Albany Institute, Albany Academy, for 37 *successive hours, commencing* 6 *A. M. of the* 21*st of December,* 1835, *and ending* 6 *P. M. of the following day.*

Lat. 42° 39′ 3″; *Long.* 73° 46′ 38″ *W.*

By a Committee of the Institute.

The hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Wet. bulb Ther.	Wind.	REMARKS.
6 A. M.	29.759	34°	36o	33°	SW	Overcast; thick clouds; wind very lig't
7	29.739	34	37	33	"	" cl. break. & mov. N. "
8	29.739	34	36	33	"	Haze; "
9	29.746	35	36	34	"	" "
10	29.751	37	38 25	37	"	" "
11	29.744	40	39	38	"	Fog rising; clouds moving NE "
12	29.733	40 50	40	37	"	Fine; light cirrus clouds; "
1 P. M.	29.719	42	42	39	"	" upper clouds moving E; "
2	29.719	42	42	39	"	" cloudless; "
3	29.734	40 25	41	38	"	" " "
4	29.741	37	38	35	"	" upper clouds moving NE; "
5	29.719	34	35	33	"	Haze; "
6	29.734	32	33	31	"	" "
7	29.739	30	32	29	"	Thick fog; "
8	29.721	29	30	29	"	Haze; "
9	29.714	28	29 50	28	"	Fine and cloudless; "
10	29.706	27	28	25	"	Thick fog; "
11	29.706	27	28	25	"	" "
12	29.706	27	29	25	"	" "
1 A. M.	29.712	25	26	25	"	Fine; light stratus clouds in hor. "
2	29.702	25	26	23	"	" " " "
3	29.702	25	27	25	"	" cloudless; "
4	29.702	25	26	23	"	" " "
5	29.707	23	26	19	"	" " "
6	29.712	21	25	19	"	" stratus clouds in horizon; "
7	29.712	21	23	18 75	NE	" fog over river; "
8	29.726	23 50	24 50	19	"	" mot. cir.-str. cl. mov. NE; "
9	29.751	25 50	26	22 50	NNE	" "
10	29.755	27 50	27 50	24	"	" light clouds moving E; "
11	29.769	30	29	24 50	NNW	" " " "
12	29.745	31 50	31	26	"	" " " "
1 P. M.	29.735	31 50	30	25	"	" "
2	29.736	31	31	25	"	" "
3	29.751	29	29	24	"	" "
4	29.759	26	27 25	24	"	" thin cir. stra. cl. mov. NE; "
5	29.812	25	24	19	"	Cloudy; cir. str. & cir. cum. cl.; "
6	29.816	23 50	24 50	19 50	"	Slightly overcast. "
Mean.	29.734	30°23	31°15	27°72		

The barometer is one of Pool's marine barometers; .044 has been added as the correction for capillarity, and for the correction for the temperature the tables given in Daniell's Meteorological Essays have been employed. There is no adjustment for ascertaining the *zero*, nor is the capacity of the cistern known.* The thermometers are graduated according to Fahrenheit, and were made by Kendall. Height of cistern of barometer above low water mark of the Hudson river at Albany, 148 feet 4.44 inches, ascertained by G. W. Carpenter, Esq. by levelling. External thermometer, 3 feet higher than barometer cistern.

* This barometer was compared with that used in March, and the mean of the 37 observations was found to be 00.165 inches less than that of Pike's barometer.

TABLE V.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Albany Institute, Albany Academy, for 37 *successive hours, commencing* 6 *A. M. of the* 21*st of March,* 1836, *and ending* 6 *P. M. of the following day.*

Lat. 42° 39′ 3″ *N.; Long.* 73° 46′ 38″ *W.*

By a Committee of the Institute.

The hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Dew point.	Wind.	REMARKS.
6 A. M.	30.035	12°	12	0°	WNW	Clear; wind very slight.
7	30.038	15	15	6	"	" fog over river; "
8	30.030	19 50	19	9	W	" st. cl. in S hor. wind plt. breeze.
9	30.024	26	24	11	S	" fleecy cl. mov. from NW "
10	30.022	32 50	31	14	SSW	Overcast; "
11	29.993	39 50	34	17	"	" "
12	29.971	41	36	17	"	" "
1 P. M.	29.950	42	38	18	"	Light cir. cum. & cir. stra. cl. "
2	29.930	42 50	39	18	"	" " "
3	29.865	39	37	18	S	Overcast; "
4	29.860	37 50	36 25	20	"	" "
5	29.849	36	36	20	"	" "
6	29.841	35	35 50	20	"	" "
7	29.844	34	35	23	"	" "
8	29.879	34	35	23	"	" "
9	29.849	34	34	19	"	" "
10	29.842	33	32 25	18	"	" "
11	29.832	33	32	20	"	" "
12	29.812	33	33	23	"	" slightly; "
1 A. M.	29.762	33	34	24	"	" "
2	29.744	32 25	33 50	26	"	" "
3	29.717	33	34	26	"	" cl. assum. stra. form; "
4	29.704	32 50	34	26	"	" "
5	29.682	33	34	26	"	" "
6	29.661	35	35	26	"	" slight flurry of snow; "
7	29.659	34	33	28	SSW	" "
8	29.659	36	36	30	"	Snowing; "
9	29.694	40	39	31	SW	" "
10	29.687	43	41 50	31	"	" "
11	29.655	44	40	31	NE	" "
12	29.660	42	39 50	31	"	" "
1 P. M.	29.606	39 50	36	34	"	" "
2	29.594	40	38	31	ENE	" "
3	29.587	43	40	30	"	" "
4	29.607	39	36	32	NE	" "
5	29.603	36 50	34 50	32	"	" "
6	29.572	33	32	30	"	" "
Mean.	29.792	34°79	33°58	22°67		Amount of snow melted and measured in rain guage, 0.19 inches.

These observations were made with one of Pike's (N. Y.) barometers, which is adjusted to zero by means of an ivory float; the correction for capillarity is .044. The attached thermometer is on the brass plate, near the vacuum chamber. In reducing the height of the column to 32°, the table given in Daniell's Meteorological Essays has been followed. The external thermometer is by Kendall, and the same that was used on the former occasion; the dew point was found by the capsule hygrometer of Pouillet. Position of instruments the same as in December. Time ascertained at noon, on the 19th, by a transit instrument.

TABLE VI.

METEOROLOGICAL OBSERVATIONS

Made at Montreal, L. C., for 37 *successive hours, commencing* 6 *A. M. of* 21*st December*, 1835, *and ending* 6 *P. M. of the following day.*

Lat. 45° 30′ *N.; Long.* 73° 22′ *W.*

By JOHN S. MCCORD, Esq., V. P. Natural History Society, Montreal.

The hours of observa.	Barom. app. par. height.	Attached Ther.	External Ther.	Direction of wind.	Force wind	REMARKS.
6 A. M.	29.796	53°	32°5	SSW	0	Clouds breaking; clear. from W; stars shining bright.
7	29.798	53	32 5	"	0	
8	29.806	53	32 25	"	0	
9	29.820	53	32 25	"	0	
10	29.820	53	34	"	0	Bright sunshine.
11	29.800	53	35	"	0	
12	29.766	54	36 5	SW	1	Clear; not a cloud above the horizon.
1 P. M.	29.736	53 5	37	SSW	1	" "
2	29.714	54	38	"	1	" "
3	29.720	55	36	"	1	" "
4	29.712	55	33	SW	1	" "
5	29.700	55 5	33	"	1	" "
6	29.724	56	33	"	2	Clear; wind freshening.
7	29.714	56 5	31	"	2	" stars very bright.
8	29.718	57	30	"	2	" "
9	29.718	58	29	"	2	" "
10	29.718	58	23 5	"	2	" "
11	29.718	58	28 5	"	2	" "
12	29.740	59	28 5	"	2	" "
1 A. M.	29.764	59	25	"	2	" "
2	29.780	59	24	"	2	" "
3	29.798	59	23 25	"	2	" "
4	29.798	58	22	"	2	" "
5	29.782	57	21	"	2	" "
6	29.780	56	20 5	"	2	Fine morn.; sky clear; a few light cl. E. ho.
7	29.794	55	20	"	2	" " "
8	29.810	56	20	"	2	" " "
9	29.820	56	21	"	2	A few light clouds drifting.
10	29.838	57	21	"	3	Cloudy; wind high.
11	29.832	57	22	"	3	Cloudy over the whole horizon.
12	29.830	57	22 5	"	3	" "
1 P. M.	29.816	57	23	"	3	" "
2	29.808	58	23	WSW	2	" "
3	29.830	57	23	"	2	" "
4	29.850	57	23 5	"	2	" "
5	29.866	57	22	"	2	" "
6	29.880	57	22	"	2	" "
Mean.	29.781	56°12	27°27			Bar. corrected for cistern, capillarity, and reduced to 32° Fahrenheit, 29.796.

These observations are made with one of Newman's (London) iron cistern mountain barometers—(Neut. point, 29.632; capillarity, .048; capacity, 1–59; temp. 60;)—whose cistern is 30 feet above St. Lawrence. Thermometers, by Newman, and Jones, (Charing-Cross, London,)—care being taken in the position of the several instruments. The appt. height of mercury in barometer being read off when the vernier is a tangent to the convex surface of the mercury. In marking the force of the wind, I have used the following rate: 0 signifies a calm; 1, a wind sufficient to blow the smoke from a chimney at an angle of 60°; 2, at an angle of 30°; 3, horizontally; 4, a gale. Thermometers graduated to Fahrenheit's scale.

TABLE VII.

METEOROLOGICAL OBSERVATIONS

Made at Montreal, L. C., for 37 *successive hours, commencing* 6 *A. M. of* 21*st March,* 1836, *and ending* 6 *P. M. of the following day.*

Lat. 45° 30′ *N.; Long.* 73° 22′ *W.*

By John S. McCord, Esq., V. P. Natural History Society, Montreal.

The hours of observa.	Barom. app. par. height	Attached Ther.	External Ther.	Direction of wind.	Force wind	REMARKS.
6 A. M.	29.918	57°	12°	S	0	Cloudy.
7	29.920	56	15	"	1	"
8	29.920	56	16 5	"	1	Clearing.
9	29.924	56 5	18	"	1	"
10	29.918	56 75	23	"	1	Cloudy; stratus.
11	29.902	56 75	27 5	"	1	"
12	29.892	57	31	"	1	"
1 P. M.	29.872	57 5	32	"	1	"
2	29.850	58	33	"	1	"
3	29.830	58	33	S by E	1	"
4	29.810	58	33 5	"	1	"
5	29.800	58 5	33 5	"	1	"
6	29.800	58	32	"	1	"
7	29.800	58 5	31	"	0	"
8	29.808	58 5	30	"	0	"
9	29.800	59	30	"	0	"
10	29.796	59	30	"	0	"
11	29.780	59 5	29	"	0	"
12	29.780	59 5	28	"	0	"
1 A. M.	29.772	59 5	27 5	"	0	"
2	29.752	59 5	27 5	"	0	Clearing.
3	29.744	59 5	26	"	0	Bright star light.
4	29.730	59 5	24 5	"	0	"
5	29.724	59	24	"	0	Clouds gathering in E.
6	29.718	58 5	23	"	0	Bright; upper current S; lower, E.
7	29.718	58	19	E	0	" "
8	29.710	58	21 5	"	1	" "
9	29.710	58	24	"	1	" "
10	29.714	59	27	NE	1	" "
11	29·710	59	28 5	NNE	1	Light snow.
12	29.700	59 5	31 5	"	1	"
1 P. M.	29.670	60	31	"	1	Sleet.
2	29.660	60	32 5	E	1	Light snow.
3	29.650	60	32 5	E by N	0	"
4	29.648	60	32 5	"	0	"
5	29.648	60	32 5	"	0	"
6	29.654	60	31	"	0	Cloudy.
Mean.	29.777	58°51	27°40			Bar. corrected for cistern, capillarity, and reduced to 32° Fahrenheit, 29.784.

TABLE VIII.

METEOROLOGICAL OBSERVATIONS

Made at the Wesleyan University, Middletown, (Conn.) for 37 ***successive hours, commencing*** 6 *A. M. of the* 21*st of March,* 1836, *and ending* 6 *P. M. of the following day.*

Lat.* 41° 34′ 43″ *N.; Long.* 72° 39′ *W.

The hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Dew point.	Wind.	REMARKS.
6 A. M.	29.866	12°	11°75	12	N	Cloudless; wind scarcely perceptible.
7	29.861	14	13	13	"	" " "
8	29.850	20 50	18	13	"	" " very light.
9	29.366	28 00	28 25	13	WNw	" " "
10	29.846	34 50	35	13	"	" " "
11	29.815	46 00	43 00	17	N	" " "
12	29.799	44 50	44 50	18	NNE	Cumu. in SE; stra. in N; w. very lt.
1 P. M.	29.762	44	44 00	17 5	"	Few cumu. cl. skirt. the hor. "
2	29.732	45	43 5	20	ENE	Light stratus cl. in W & NW; "
3	29.714	46	43 50	22	S	Overcast; lt. cir. str. cl. mov. E; g. br.
4	29.684	45 00	44 00	22	"	Cloudy; cl. mov. to the E; strong br.
5	29.715	44	43 50	24	"	" gentle "
6	29.712	43 50	40 00	26	"	" " " "
7	29.685	44 00	34 50	26	"	Sky clear, ex. few lt. cl. in hor.; lt. "
8	29.690	42 50	38 75	26	"	" " " very " "
9	29.690	42 50	38 50	31	"	Sky overcast, & cl. mov. E. " " "
10	29.687	42	37 50	28	"	Clouds skirting S hor.; wind fresh.
11	29.672	41	37 50	29	"	Cloudy; " light.
12	29.648	41 50	38	29	"	" " fresh.
1 A. M.	29.615	41	38	28	"	" " light.
2	29.596	40 50	37 50	26	"	" " strong.
3	29.562	39 50	36 50	26	"	" high wind.
4	29.549	39 00	34 50	27	"	" "
5	29.549	38 00	35 50	27	SE	Flying clouds mov. NE; "
6	29.534	38	35	27	"	" " strong wind.
7	29.500	39 50	39	27	"	Fair; few light. cl. mov. N; "
8	29.491	42	43 50	27	"	Light stra. clouds mov. NE; "
9	29.487	42	41 50	27	"	Cumulus moving to NW; "
10	29.460	42 50	41 50	26	"	Cloudy; cum. stra. mov. NW; "
11	29.440	42 50	41 50	26	"	" clouds dense; " "
12	29.412	42 50	41 50	25 5	"	Snow; clouds mov. to NW; "
1 P. M.	29.389	42	41	26	E	" " unbrok. & dense; gentle.
2	29.365	41	41	28	"	" " " "
3	29.345	41	41	28	ENE	" grd. cov. with new snow; w. lt.
4	29.325	41	41	28	NE	" " " "
5	29.325	41	41	28	"	Snow falls very fast; 2 in. deep; "
6	29.325	41	41	28	"	" " 5 " "
Mean.	29.612	39°34	37°49	23°92		Amount of snow melted and measured in rain guage, 0.31 inches.

Height of cistern of barometer above low water mark of Connecticut river at Middletown, 180 feet.

TABLE IX.

Some of the Instructors of the Institute at Flushing having understood that "on four fixed days in each year, the 21st of March, 21st of June, 21st of September, and 21st of December, (unless any of these days should fall on Sunday, in which case, for the 21st substitute the 22d,) horary observations of the barometer, thermometer, wet and dry thermometer, clouds, winds, meteors, &c., were to be made by scientific men in different parts of the globe, at the commencement of each hour, (per clock,) mean time at the place, for 37 hours: beginning at 6 o'clock on the morning of the 21st, and ending at 6 o'clock on the evening of the 22d; and that it was deemed highly desirable that the points of observation should be multiplied by the co-operation of societies and individuals," have made the following observations on the 21st and 22d of March, 1836.

The instruments used were made by the Messrs. Pike of New-York, but they have not been compared, by the observers, with any of acknowledged accuracy.

METEOROLOGICAL OBSERVATIONS

Made at the Institute, Flushing, L. I., for 37 successive hours, commencing at 6 A. M. of the 21st of March, 1836, and ending at 6 P. M. of the following day.

Lat. 40° 44′ 58″ N.; Long. 73° 44′ 20″ W.

The hours of observation.	Barometer.	Attached Ther.	External Ther.	Wet bulb Ther.	Winds, from,	Clouds, to,	Strength of wind.	REMARKS.
6 A. M.	29.90	45°	18°	18°	NE	.....	Hardly any.	Fine; thin misty vapours in the horizon.
7	29.91	45	21	20 5	SW	.....	"	" " "
8	29.92	46	25 5	25	"	.....	"	" mist cleared.
9	29.93	46	31 5	30 5	S	NE	Very light.	Light clouds rising in the west.
10	29.91	47	35	32	"	"	"	Streaked white clouds in the west and northwest.
11	29.90	46	38	33 5	SE	"	"	Large spread cloud rising in the west.
12	29.89	46	41 5	37 5	"	"	"	Grey clouds overspread.
1 P. M.	29.88	48	39 5	33	"	"	Gentle.	" "
2	29.86	48	39 5	34	"	"	"	Clouds a little darker.
3	29.83	47	37	33	S	"	"	Black clouds coming up from the west.
4	29.82	47	36	32 5	"	"	Fresh.	" "
5	29.81	46	35	32	"	"	"	Clouds lighter; breaking in the west.
6	29.80	46	32 5	30 5	"	"	Gentle.	A few scattered clouds.

7	29.79	44°	30°5	29°	"	"	"	" "
8	29.78	43	31 5	30 5	"	"	"	Overcast; dark clouds.
9	29.78	43	32	31	"	"	Very light.	"
10	29.76	43	33	32	SE	N	"	"
11	29.73	42	33	32	"	"	Gentle.	Thin misty low clouds.
12	29.71	42	33 5	32 5	"	"	"	Fine; a few thin clouds in the northwest.
1 A. M.	29.70	42	32	31	"	.....	"	Clear.
2	29.68	42	32	31	"	N	Fresh.	Large cloud in the north.
3	29.65	47	32 5	31 5	"	"	"	Clouds spreading.
4	29.62	48	33	32	"	"	Brisk.	"
5	29.62	48	32	31 5	"	"	"	Dark clouds all overspread.
6	29.59	48	33	32 25	"	"	"	" a break in the east.
7	29.58	48	34 5	34	"	"	Gentle.	Clouds lowering and spread.
8	29.55	44	36 5	36	"	NW	"	" darker in the west.
9	29.55	44	34	34	S	.....	Hardly any.	Thick snow,
10	29.55	43	33 5	33 5	.....	.....	Calm.	"
11	29.53	43	33 5	33 5	NW	.....	Very light.	" Storm commenced at 8½ A. M. with gentle rain,
12	29.51	44	32	32	"	.....	Gentle.	" at 12 there had fallen 5 inches of snow, and
1 P. M.	29.50	45	32	32	"	.....	"	Sleet, at 4 P. M. when the storm ended, there had
2	29.48	45	31 5	31 5	"	.....	Brisk.	" fallen 7 inches.
3	29.48	45	31	31	"	.....	Fresh.	"
4	29.48	45	31 5	31	"	SE	"	Clouds breaking in the west.
5	29.49	44	31 5	31 5	N	"	Gentle.	Dark clouds, mostly spread.
6	29.48	45	31	30 5	"	"	"	Clouds broken in the west; dark in the northeast.
Mean.	29.701	42°43	32°71	31°31				

Height of barometer above low water mark of Flushing bay, 54 feet.

TABLE X.

METEOROLOGICAL OBSERVATIONS

Made at Cincinnati, for 38 *successive hours, commencing at* 5 *o'clock A. M. of the* 21*st of March,* 1836, *and ending at* 6 *o'clock P. M. of the following day.*

Lat. 39° 6′ *N.; Long.* 84° 27′ *W.*

By John Locke, M. D., Professor Medical College, Ohio.

Hour.	Outward Ther.	Wet bulb.	Dew point.	Barom. correct'd	Attached Ther.	Course of wind.	Strength of wind.	Course of clouds	Ang. vel.of cl. in 10sec	Hy-grom.	REMARKS.
5 A. M.	26	.....	.....	29.219	39°	.....	Inch.	W	4°	...	Dappled cir. stra. covering. all exc. E hor. & mov. ra-
6	26	.....	.....	29.210	39	SE	0.095	"	....	240	Clear, except E horizon. [pidly from W.
7	27	.....	15	29.210	40	S	.070	"	2 30	351	Dappled cirro stratus from W.
8	34	29°2	.....	29.156	47	SW	.160	"	....	225	A nimbus passing by to the S.
9	40	31	18	29.144	51	W	.400	WSW	2 30	215	Cumuli in SE; nimbus in W.
10	44 25	36	.....	29.136	54 5	"	.380	W	2 30	203	Overcast; sun barely visible.
11	43	34	.....	29.116	54 5	"	.297	"	....	185	Clouds dark, wintry, ragged in W.
12	37	33	27	29.115	51	"	.397	"	3	350	Squall of snow.
1 P. M.	42	34	.....	29.135	54 5	"	.397	"	4	279	" passing.
2	41	33 5	.....	29.130	56	"	.554	"	....	203	A slight squall just passed.
3	41 5	32 5	16	29.154	58	"	.699	"	1 30	162	Black cloud just passed; snow.
4	38	31	.....	29.180	56	"	.487	"	2 30	166	Cloudy; wind gusty.
5	35 5	31	.....	29.195	53	"	.339	WNW	2 30	171	Squall of snow for 15 minutes.
6	32	30	13	29.216	50	WNW	.339	W	3	170	Breaking in W; clouds dissolving.
7	32	27	.....	29.230	55	"	.368	"	2	190	A few flakes of snow.
8	30	.....	.....	29.230	54	"	.080	"	1 30	200	Black clouds rising rapidly in W.
9	28	.....	15	29.250	55	"	.162	"	....	212	A little snow fell as cloud passed.
10	27	.....	.....	29.260	57	"	.311	"	....	205	Clear; black clouds in S.
11	26	.....	.....	29.270	55 25	"	.254	"	....	207	"
12	26	.....	13	29.270	57	"	.229	"	....	216	"
1 A. M.	26	.....	.....	29.270	55	"	.104	"	....	225	Heavy black clouds; a little snow.

2	26	.....	.....	29.182	55	"	.104	"	...	224	Cloudy.
3	25	.....	10.5	29.260	56	"	.162	"	....	221	Snowing a little.
4	25	.....	. ....	29.285	54	"	.104	"	....	286	Black clouds.
5	25	.....	.....	29.291	53	NW	.075	W	...	283	Clouds broken.
6	24	.....	10.5	29.325	51	"	.125	"	3	214	Cloudy; snowing a little.
7	24	.....	.....	29.354	51 5	WNW	.104	WNW	4	205	" a few particles of snow.
8	25	.....	.....	29.376	53 5	NW	.203	"	5	214	" a little snow.
9	29	.....	10	29.395	54 5	WNW	.254	"	5	205	"
10	29	.....	.....	29.394	65	"	.203	"	4	203	" and a little snow.
11	30 25	.... .	.... .	29.431	63	"	.151	"	3	189	"
12	31	27	11	29.449	64	W	.151	W	2 30	180	"
1 P. M.	32	29	.....	29.435	58	"	.162	"	2	176	"
2	33 5	27	.....	29.415	64	NW	.162	"	1 40	153	Clouds broken.
3	34	23	10	29.445	64	WNW	.203	"	1 40	135	Flying clouds.
4	32 5	28	.....	29.450	59	"	.254	NW	1 40	144	"
5	31	26	.....	29.466	54	"	.151	N	1 15	146	Upper stratum W; lower N.
6	29	.....	9	29.450	49	"	.125	NW	1 15	162	Clouds distinct, but crowded.
Mean.	31.662			29.277			238.2				Height of the cistern of the barometer above low water mark of the Ohio river, 135.74 feet.

The column of the strength of the wind is estimated in the decimal of an inch of water according to Lind's scale. The scale of the hygrometer is divided into one thousand degrees, from extreme dryness to extreme moisture. The time included in the above observations was marked by pretty uniform phenomena. There was a succession of nimbus clouds passing rapidly from the west, sometimes crowded upon each other in such a manner as to obscure the whole sky, but still evidently detached and distinct, each cloud being marked by a darker shade in the centre, at other times so far separated as to afford almost a clear hemisphere for fifteen or twenty minutes. The more dense clouds often scattered a little snow, but not sufficient to whiten or moisten the ground for more than a few minutes. The wind was in strong sudden gusts, whirling the snow wildly in eddies through the air. The anemometer is a self-registering instrument, of my own invention, and marked the *strongest* gusts. The angular velocity of the clouds was taken as they passed the zenith; not very exactly, because the edges of the clouds are indefinite and often dissolving. The time of the angular velocity was ten seconds. I am under obligations to my friends, Doctors Threlkeld and Orr, for continuing the observations through the night.

TABLE XI.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Royal Society, Somerset House, London, for 37 *successive hours, commencing* 6 *A. M. of the* 21*st of March,* 1836, *and ending* 6 *P. M. of the following day.* (*Greenwich mean time.*)

Lat. 51° 30′ 49″ *N.; Long.* 0° 5′ 47″ *W.*

By Mr. J. D. Roberton, Assistant Secretary Royal Society.

The hours of observ.	Barometer corrected.	Attached Ther.	External Ther.	Rain in inches.	Wind.	REMARKS.
6 A. M.	30.124	53°6	47°3	....	S	Overcast; light wind.
7	30.132	53 7	47 2	....	SW	" "
8	30.124	53 7	47 2	....	"	" "
9	30.113	53 7	48 2	....	"	" "
10	30.102	54 0	49 2	....	S	" "
11	30.083	54 7	50 7	....	SSW	" "
12	30.071	55 3	51 7	....	SW	" "
1 P. M.	30.053	55 9	52 7	....	"	" "
2	30.035	56 3	53 4	....	"	" "
3	30.017	56 6	53 7	....	S	" "
4	30.002	55 7	53 0	....	"	" "
5	29.988	56 4	52 3	....	SW	" "
6	29.938	55 9	51 9	....	"	" "
7	29.994	55 4	50 9	....	"	" "
8	29.990	55 0	50 6	....	"	" "
9	29.988	54 8	50 3	....	.....	" "
10	29.976	54 7	50 3	....	.....	" "
11	29.968	54 5	50 0	....	.....	" "
12	29.961	54 4	49 8	....	.....	" "
1 A. M.	29.946	54 4	49 5	....	.....	" "
2	29.944	54 3	49 0	....	.....	" "
3	29.929	54 2	48 8	....	.....	" "
4	29.924	54 0	48 7	....	.....	" "
5	29.917	53 8	48 6	....	S	" "
6	29.907	53 6	48 6	....	"	Cloudy; "
7	29.922	53 7	49 4	....	SW	" "
8	29.917	54 0	50 0	....	"	" "
9	29.922	55 2	50 8	....	S	" very light rain and wind.
10	29.932	55 4	51 0	....	S var.	" " "
11	29.920	55 8	51 5	...	"	" " "
12	29.913	56 5	52 2	....	SW	" " "
1 P. M.	29.899	56 4	51 8	....	"	" " "
2	29.897	56 3	52 4	....	S	" " "
3	29.875	55 8	51 7	....	"	" " "
4	29.865	55 5	51 6	....	"	" " "
5	29.861	55 3	51 3	....	"	"
6	29.870	55 1	51 2	.027	SW var.	Overcast; light wind.
Mean.	29.975	55°0	50°5	.027		

This table not having been received until the preceding were in type, is inserted here instead of its proper place, which should be after Table III.

Art. VIII. Annual Address, *delivered before the Institute, April* 19, 1836, *by* Daniel D. Barnard, LL.D.

GENTLEMEN OF THE INSTITUTE,

The occasion of the Annual Address before the Institute, is a proper one for reviewing the past and for anticipating the future. The course of remark which I propose to myself at this time, however, will not allow me to dwell on the spent labours of this learned body. The results of those labours are on record. They are incorporate with the period. They are already of the substance of that imperishable history—the most important of all—the history of the human mind. The disadvantages under which they have been achieved, and the limited means enjoyed, will not be forgotten; and the Institute may point to what has been accomplished, not merely without reproach, but with just and honest pride. A library has been formed, a museum has been established, and the transactions of the society have been published. These transactions will show with what spirit its members have entered a wide field of enterprize. It will be found that they have not been disposed to content themselves even with the full possession of the paternal territories, the ample inheritances of knowledge. Already, in their brief time, have successful incursions been made into distant provinces; sometimes to explore regions often visited but little understood; sometimes penetrating to higher and almost unattempted latitudes; and always bringing back contributions which have added actual riches to the general treasury of science and learning. In the mean time, the society, looking steadily forward, has applied itself faithfully, in the collection of books, specimens and apparatus, to the enlargement and supply of its *depot* of provision and materiel for the prosecution of deeper study and of more extended discovery.

But while it would not be unbecoming in me, as a recent member of the Institute, and one who has contributed nothing to its prosperity, to speak of what it has done in terms of high commendation, and make the past the theme of my discourse, yet I shall not indulge in so grateful an employment. My

view of the position which I have here the honor to occupy, leads me to adopt a different course. I shall seek to discharge this duty with special reference to the practical advantages which ought to result from the exercise. And I propose, therefore, to ask the attention of my fellow members to the consideration of topics which may tend, in the result of their discussion, to shew the true relation in which this and all our institutions of learning stand to the community in which they exist; to reveal the essential connection of these institutions with each other; and to suggest the way in which their mutual means and resources must be enlarged, and how their individual and united action may be rendered more comprehensive and more effective, and adequate to the mighty purpose they are designed to accomplish.

In the preamble to its charter of incorporation, the object of the Institute is declared. It was organized "for the promotion of science and literature." Here were individuals, only a handful, who were known to be devoted to the extension of the kingdom of human knowledge, and a leading design undoubtedly was, to enable them to unite their efforts, and to furnish and surround themselves, as far as possible, with the needed and indispensable aids to profound study and research. It was proposed that here, at the capital of this State, an institution should be located, which should take an active, and it might be, an efficient part, in those great labours which elsewhere the learned associations of our own and other countries were prosecuting.

It is well understood how entirely the world is indebted to the voluntary efforts of individuals for the state to which learning is already advanced. It has been so in all ages and in all countries; and in a great measure it will continue to be so to the end. In every department, its history may be read in the biography of a few names. Take for an example the scientific arrangements in Zoology. Ray acted on a suggestion dropped by Aristotle nineteen centuries before; Linnæus improved upon Ray, and Cuvier has rivalled Linnæus. Here is the outline, and the filling up would be almost equally brief. And then it is to be noted, that it is not merely that science

has engaged the labours of but few persons, but that all great discovery, all brilliant result, all actual advance, has been the product of their spontaneous and unpurchased zeal. In modern times, and since the natural sciences have been cultivated by the methods of true philosophy, profound investigation and discovery have been pursued and wrought out in a great degree by individuals attached to learned institutions;* these institutions having, for the most part, one of these two objects in view; either directly the cultivation of learning by the members as a substantive business, and the publication of the results of their labors, in the manner of the Royal Society of England, or their design has been instruction to resident scholars, as in the colleges and universities in Europe and in our own country. Sometimes, however, both objects have been united, if not at the beginning, in the progress of their existence, as in the instance of the academies at Paris and Berlin.

But attached or not, to learned associations, deep and successful study has always resulted from the natural and resistless promptings of individual mind, impelling to severe and almost superhuman effort, in a sphere quite above any assumed or assigned range of private or professorial duty. It has been effort which princes have not been rich enough to purchase, and which principalities and powers have not been able to repress. Let gentlemen pass the field in review before the mind, and they will satisfy themselves that this remark is of almost universal truth and application.

See how it has been with Astronomy. Copernicus was a Doctor of Medicine at Cracow, and went into voluntary exile in Italy for many years, becoming a student at Bologna and a professor at Rome, that he might prepare himself to bring out his system. Kepler was the recipient of imperial favors, in the form of appointments to professorships, but war and bigotry cheated him of his salaries, and he was forced to study and practise physic for his livelihood, while actually engaged in prescribing laws for the courses of the planets. And not to

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* It is true, also, as remarked by Dr. Smith, that the greater part of the eminent men of letters, both of Greece and Rome, appear to have been either public or private teachers, generally either of philosophy or of rhetoric.

mention other names in this department, Newton had formed a distinct conception of his three great discoveries while a student and fellow of Trinity College. Herschel, it may be added, had constructed the reflector with which he discovered a new primary planet, before he relinquished his engagements as a music master.

And as we find it in Astronomy, so it has been throughout the circle. And here it is desirable to understand, how much credit is due to the public—to political communities and to governments—for the actual advance which at any time has been made in science. Undoubtedly, governments have done something for the preservation of knowledge, and something for diffusing it in some degree, greater or less. These are the purposes for which public schools, colleges and universities have been established.* The primary object in all these is instruction—instruction of course in what is known; and it is expected, therefore, in the higher institutions, that those who conduct them shall possess themselves of all learning, up to its highest state of advancement at the period, that they may be able to impart it. The tendency unquestionably is, to keep the learning of the age from absolute retrogression. But whatever more shall be accomplished, is expected, if at all, to come of individual enterprize, acting too often under the double discouragement of inadequate support and of oppressive exactions. It is true, however, that in some countries, their educational systems have been arranged under state authority and endowment, with a distinct view to enlarge, as well as maintain, the boundaries of knowledge.

And yet, on the whole, this has been a most neglected interest in the hand of governments. It was for this very reason, that learned men, seeing the necessity of making some effectual provision for it, at a very early day set themselves to devise that plan, which consists in the establishment of voluntary associations, like this I am now addressing, for the pur-

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*But by far the greater part of all such establishments, wherever situated, were originally founded and endowed by individuals, though subsequently adopted and patronized by the governments. The English university colleges originated in this way.

pose, not merely of preserving, but of promoting science and literature.

These societies were known in ancient times, and were established first after the revival of letters in Italy, under the name of Academies. Upwards of five hundred of them existed in the Italian territories alone. The example was followed, sooner or later, in every quarter of Europe, and has been imitated in our own country.

Of these institutions, or at least of certain favorite ones, it has been the fashion for ecclesiastical and political dignitaries to become the patrons. The academy at Alexandria was patronized by the Ptolemies. The Arab caliphs patronized academies both in the west and in the east. The academies of Italy were patronized by her merchant kings. The princes of Germany have not failed to afford a like condescending countenance and support. Even Russia has her academies, and some of the most extensive and magnificent which exist, in like manner under imperial sufferance and protection.

Now it must be admitted that these associations, as well as the educational foundations, which have occupied ground with this sort of southern aspect, though sometimes in danger of being dazzled or scorched from a too direct and near exposure to a gorgeous and burning sunshine, on the whole have derived advantages from their position, which have been essential to the success and glory that have attended their career. It has happened generally, that kings have taken care to open reservoirs near the throne, into which a large portion of the surplus wealth of their respective kingdoms has been uniformly gathered. And so it has been found, from motives almost as various as the instances, that they have been induced to let out some streams of royal charity in the direction of these institutions, which have thence felt at once the benefit and the burthen of their patronizing and ostentatious munificence. But while contemplating the golden showers that have been shed on such establishments from these high latitudes, we must not forget the fertilizing effect of those copious irrigations which have been supplied to them from sources of individual and private bounty, nor the living influence of those perpetu-

al dews that always fall on them from surrounding atmospheres, such as are never overcharged but never dry. Let the gauge be accurately taken, and it will assuredly appear, that the crowning and superior measure of support in these cases, on the whole, has come of the largesses of subjects, not of kings.

It has been the pleasure of sovereigns that certain magnificent establishments of a literary and scientific character, existing in the name and under the control of royalty, should adorn the capitals of their empires; and in furtherance of this object they have sometimes indulged in princely profusion. And yet it is remarkable that scarcely an instance can be found where one of these establishments has originated with the titular head of a government, or has been sustained by its authority and means, at least without the aid of large individual contributions, or of gross public robberies. The imperial library now at St. Petersburgh, containing 400,000 volumes, set out with a capital of 200,000 volumes, which had been collected at the private cost of an ecclesiastic in Poland. Zaluski in his life time, had generously opened his library to the public, and at his death the government seized it as its own, to the exclusion of all claims on the part of his lawful heirs. The royal academy of sciences at Paris did not receive the sanction of the king for more than thirty years after it had been founded by Colbert. The king's library at the same place received a supply of 100,000 volumes at one time, the property of French subjects, wrested from them on the suppression of monastic houses. The museum of natural history at the Garden of Plants, the most extensive in the world, owes its existence to the solicitations and zeal of two physicians of Louis XIII. Sir Robert Cotton laid the foundation of the British Museum, by the gift of an invaluable private collection. The celebrated royal society of London was wholly a private association for many years, and even now, since its incorporation and adoption by the government, each member pays an admission fee of eight guineas, and an annual contribution of four guineas, to sustain it.

The simple truth is, that the burthen of the pecuniary supplies indispensable to the promotion of learning, has fallen, in an oppressive degree, on that very class of persons, few in number and little able to bear it, who have been also entirely relied on to sustain the necessary labors of study and investigation. Beyond this narrow circle, this great interest has depended very much on individual charity, while governments, with some notable exceptions, have either neglected it, or contributed with a reluctant and sparing hand to its support. It is painful to be obliged to add, that in no enlightened country has so little been done for the cause under public authority, as in our own. It is time, however, that the truth on this subject should be boldly spoken; and, for one, I am fully resolved that no false pride of country shall prevent me from giving it distinct and emphatic utterance.

Of the necessity of endowment from some quarter, to sustain and encourage learning, not only in its higher walks, but in nearly all its departments, it seems to me that no one who will cast an eye over the tract of its history can entertain a doubt. It never would have been doubted, even perhaps by Adam Smith, but for the abuses which have sometimes grown out of particular systems. The evils which belonged to certain modes of encouragement, have been imputed to encouragement itself. One thing is at least indisputable. Learning has in fact been sustained throughout the world by endowment; and I hold it idle to pretend that the educational and scientific institutions of any country ever have been, or could be supported permanently without it. It must be borne in mind, that just in the degree in which learning every where fails to sustain itself, it is sustained by endowment; and it is better that we should accustom ourselves to the use of the term in this sense. In every conceivable shape in which aid comes to an educational or literary establishment, beyond what it receives in direct return for services rendered, it is actual, beneficial endowment. If an institution be possessed of an ancient territorial estate, as the corporations of Oxford and Cambridge; if its members receive a stated salary from the government, as those of the French Institute; if bequests or dona-

tions be made to it, in money, books, apparatus, models or specimens; if funds are raised for it, whether for temporary or permanent uses, by voluntary subscriptions, by lottery, or, as in the case of the Albany Academy, by appropriations from a city corporation—all this, be the amount in any given case great or small, is endowment; and a little reflection will satisfy every one how universal is the practice of endowment for literary uses, as well in our own country as in every other.

It is not therefore a question whether learning shall exist with or without endowment. It will exist with it, or not at all. It was the error of a great political economist to suppose that the doctrine of demand and supply was applicable to all the dealings in knowledge, as it was to the trade in bread stuffs and cotton fabrics. Before any such conclusion was drawn, it should have been made to appear that there was some analogy between the cases. If there was in the human mind a natural appetency for knowledge, like that which exists in every man to supply his animal wants and to make gain, a faculty which would educate itself and pursue its end by the intelligent use of the most appropriate means, then indeed it might be concluded that it were better to treat learning like merchandize, and let it alone. But while it is fairly disputable that any such distinct affection as a desire of knowledge exists; while it cannot be shown that the mind feels any original impulsion after knowledge, beyond what is observable in the natural constitution of the particular powers fitted for acquiring it, and which, like all the active faculties, are enlarged and gratified by exercise, and are dormant without it; and while it is certain that the ignorant and uninstructed can not comprehend the higher uses or the true pleasures of knowledge, any more than the congenital blind can understand colors, and are therefore not likely to be drawn into the pursuit of it by any discovered charms in the subject itself, what chance would there be, let me ask, for learning, if the cultivation of it must be left to be regulated only by the natural and spontaneous demand? It should be enough to know, that no system of education, for any grade or rank in life, in any age or land, has ever yet sustained itself, in the way in which a

mechanical trade, or a branch in merchandize in the hands of an individual or a company, sustains itself. And the same thing is true of all plans for the promotion of learning, as by voluntary associations and otherwise. There is always a lack of willing customers. The necessity of keeping up a large supply, and in a manner forcing the commodity on the public, is understood only by a comparatively small number, while the mass, for whom the benefit is directly intended, and who, as a body, are abundantly able to pay the cost of production, cannot comprehend their need of it, and refuse to give an equivalent for its value.

As I have said, therefore, the question is not, whether endowment shall or shall not be employed. In some shape, it must be acknowledged to be indispensable to the preservation of learning. Nothing effective can be done without it. All those mighty interests which are connected with the progress of mental illumination, are absolutely dependent on it. Among an enlightened audience, and on an occasion like the present, I shall assume that not one individual can be found who would be willing to commit the interests of learning and education in this country solely to the support which they would derive from a spontaneous demand for their benefits, accompanied by a voluntary disposition to render a full and just equivalent for the value received. The question then which presents itself, and a grave and important one it is, is this; what shall be the mode or system of endowment adopted in our country for the preservation and advancement of learning, and for the universal instruction of the people?

It will be observed that I speak of adopting a mode, as if, up to the present time, no established system whatever had existed; and such I hold to be nearly the fact. I cannot call that a digested system, which abandons the most considerable portions of the subject to chance or charity; which concerns itself with plans for cherishing certain favorite extremities, while the heart is ready to stop for lack of proper stimulus and vital heat. It will be observed also, that I speak of endowment, not as needed alone for popular education, or to sustain our higher seminaries, but as equally necessary to support our

academic and learned associations. As connected with endowment, I desire to be understood as regarding learning under the notion of an entire system, closely related in all its parts, bringing its utmost extremities together, and uniting the very alphabet of knowledge with the sublimest speculations of philosophy.

Looking then at the whole subject in this view, it remains to inquire, whether we are to have a rational and systematic plan of endowment for the support of learning in this country—for there is only one general mode by which such support can be rendered permanent and effective—or whether we are to go on in the old way, committing the whole cause to the hazard of uncertain supplies, from unsteady and precarious sources; gleaning a little in this quarter and a little in that; resorting to financial schemes, always inadequate, sometimes founded in cheatery and trick, and sometimes in flagrant immorality; and appealing not seldom to motives and passions which all parties are, or ought to be, ashamed to avow?

With us, I mean in the United States, our educational and literary system may be described in general terms, as consisting of primary schools, of academies or grammar schools, of colleges or classical and scientific schools, of schools for professional education, and of associations designed for the promotion of learning generally or for the cultivation of particular branches. Such, in brief, is our system; and we shall soon see whether this system, in all its parts, is what it ought to be—and whether learning is receiving with us that encouragement and support which its importance demands?

To begin with our common schools. These are endowed, as they should be, in several of the States, by the State government. The plan in our own State is justly regarded with admiration. In many respects it is admirably devised, and so long as nothing better can be accomplished, it ought to be strenuously supported. But we have only to compare what is actually done in the work of primary instruction with what should be done, and must be done, if we would elevate the character of our people and save the country, to discover that the present endowment is wholly inadequate to the object.

Popular education is in no degree what it ought to be. It is absolutely necessary that the standard should be raised, or we are not an educated people. And how is this to be done? Not certainly with our present modes of instruction, and under the present race of common school teachers. And how are better teachers and better instruction to be supplied? Not certainly for any compensation which is now afforded. The pay of teachers is obtained from three principal sources; from the State; from the property of the towns by taxation, which is of two kinds, compulsory and voluntary; and from tuition fees. The impulse to this financial scheme is given by the State, which sets the example of offering to a district about the average sum of ten dollars towards an annual compensation for the services of a school-master. With ten or twenty dollars more, as the case may be, raised by taxation, the school-master is provided with his outfit. This he can depend upon, and if he gets any thing more, it will be just in proportion to the spontaneous demand which may exist for his wares; a demand which is never active when the articles are of prime quality, but which must be dreadfully heavy when they are known to be nearly worthless.

Now, that common schools should be well taught, you must have competent teachers; and as these cannot be found, it has been proposed to create them. An excellent plan to this effect is now in operation, under the patronage of the State. Eight selected academies have a department in each for the instruction of a few teachers. To supply the actual demand on the present foundation, there should be one hundred academies, with one hundred pupils in each, destined for this employment. But this apart. It concerns us more now to inquire, how are the services of these qualified teachers to be secured for common schools, and how paid for? If thoroughly instructed in the range of studies prescribed for them,* it is quite evident to me that they will find occupation in your academies, even in high departments, at a salary of $400, rather than labor in your common schools at ten or twelve dollars a

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Vide Note A.

month; or they will seek compensation for their services as masters of select schools. It seems to me certain that no benefit, not the most inconsiderable, is to be felt by the common schools from this instruction of teachers, unless, as a necessary part of the very plan itself, the means of payment for the enhanced value of their services be devised and supplied. This result is evidently apprehended by the able Superintendent of Common Schools. But the hope seems to be indulged that the people, on this subject, will break their own lethargic slumbers, and rouse themselves in gladness as the light approaches. In my opinion, the first feeling would rather be to turn from it, as painful to the vision. And besides, what is to wake them up? Is it to be some inward motion, or some outward impulsion? Will the offer of a competent teacher, and a lecture on the importance of better instruction, answer the purpose? It is warring with all experience to think so. Moreover, why cannot the truth be understood at once, and once for all, that no plan for the amelioration of the popular condition, being designed to operate through the active and voluntary agency of the people themselves, which does not address itself to the known composition and constitution of the human mind, ever can become a successful one? If we intend to put this machine in motion, we must employ the powers which it has, and not idly attempt to task it for any which it does not possess. In short, we must employ mind as an agent, just as we do solid matter, and water, and air, and steam—according to its properties and laws: and if otherwise attempted, we shall only reap disappointment and ruin. When we talk to the ignorant and the uninstructed about education, and the moral elevation it gives, we are uttering harmonious sounds to the deaf, and exhibiting brilliant colors to the blind. We address no intelligent faculty, and no known motive, and we excite no favorable feeling beyond that of a mute and stupid wonder. If we go one step farther, and, pointing to the higher classes, and to the visible effects of cultivation on individuals, in advancing them in the eye and consideration of the world, make an appeal to the spirit of emulation and ambition within them, we shall probably strike a chord that will

answer; but what the answer will be, is by no means so clear. Possibly the impulse may be of an elevating and upward tendency; yet it is much more likely to manifest itself in a dogged determination to preserve their own condition, and drag all above it down to its degraded level. But let the impression be the most favorable that could be desired, we have next to present our scheme of finance. We have now to tell them that their improvement will involve a serious expense and a liberal outlay, and that it is expected of them to make a voluntary provision for all the extra cost. And we shall no sooner have dropped a hint of the sort, than we shall find that we have alarmed their love of gain, and their honest apprehensions about the due supply of their animal wants and the full gratification of their animal propensities, and that having effectually aroused the dominant feelings and affections of the vulgar mind, our mission of benevolence has come to an utter end.

If the teachers whom we are instructing at the public expense are to be employed in common schools, as no other provision is made for them, it is of course expected that the demands for their superior services are to be met and paid for by tuition fees; and it is expected also, that they shall be employed as fast as they can be qualified, the foundation being extended, with due perseverance, until every district in the State is supplied.

The sum of the wages of common school teachers for one year, in this State, is at present about $700,000. I handle the statistics of this subject in round numbers, but with sufficient accuracy for my purpose. Of this sum, $300,000 may be regarded as endowment, and $400,000 is the amount paid by the rate-bills for tuition. This sum is paid for 540,000 children, or each child pays an average bill of about seventy-five cents. The average stipend paid to the teachers reaches the height of about seventy dollars each in the year; a sum which I make no doubt, is out and out equal to the value of their services.

But now it is proposed to send into each district a competent teacher, and I put down his salary at $400, as the lowest amount which should be thought of, if it be seriously intend-

ed to raise the standard of education and elevate the character and condition of the people. As there will be 10,000 schools to be supplied, there will be four millions to be raised for teachers' wages, instead of $700,000: and no less than $3,700,000 is to be supplied, on the present plan, from tuition fees. That is to say, each town will pay in fees an average sum of $4,353, each school district $363, and each scholar $6. 84. And this, be it remembered, will be in addition to the expenses incurred in the erection and furnishing of school-houses, in the purchase of school books, and in the taxations, both coercive and voluntary, to which the property of the town must be subjected for teachers' wages. I am sure I need not add to this statement one word to demonstrate that the instruction of teachers is to avail us nothing, if the State cannot be persuaded to put forth its energies in the reconstruction of the entire system.

The attitude which I have here assumed, places me under an indispensable obligation not to leave this subject without some suggestion, however crude it may be, and however little weight or authority it may carry with it, of what ought to be done in the premises. I shall not presume to offer any thing like a detailed plan; my purpose is only to indicate a course of action in the most general terms, and to insist on certain great leading principles which should govern all conduct in the matter, and which, once adopted and firmly adhered to, cannot fail, I am persuaded, to suggest the best methods and lead to the best and the grandest results.

In the first place, then, as a thing to be insisted on most of all, the government must lead the people in this business, and not wait to be led by them. This principle is found, certainly, in our common school foundation, as it stands, but let me have leave freely to say, that it is not acted on with as much boldness as it should be. I respect, as much as any man, that feeling of caution which makes legislation afraid lest it should chance to commit unnecessary and improper encroachments. But there is a difference between caution and cowardice; and there are some matters which cannot be treated judiciously without being touched with a bold hand. Such an one, in

my judgment, is that we are now considering. Let us impute to the people, in political affairs, whatever wisdom and sagacity our love of them may teach us to give them credit for, but let us keep this subject apart for the exercise of our honest regard for the philosophy and the truth we may find involved in it.

Of one thing let us be entirely satisfied: that it is in vain to expect the people to make a voluntary upward movement, from their present level, in the work of education, just because it is not in the constitution of man to do it, and because not one example of the sort can be found in the whole history of the race. We must adopt the maxim, which is the chief wisdom and praise of the common school system as it now exists, that the people will move in this matter only as they are moved upon, and that it is the business of the State to supply the motive power; and, once adopted, the maxim must be fearlessly carried out in practice.

I hope I shall not be understood by these suggestions, that we are to copy implicitly any military system of discipline, designed to afford just illumination enough to complete and perfect the training necessary to form accomplished and effective subjects for an iron despotism. In this light do I regard the educational modes established in Prussia. At any rate, one thing is agreed on all hands, that the police of that system is utterly inapplicable and impracticable with us, though it is admitted we may glean from it some excellent lessons.

Still, in my opinion, this is the very country where government should do more for learning, under its just authority, than is done in any other, instead of less.* It seems to me that it should be assumed as an unexpressed but necessary part of the compact into which the people of this

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* Yet, undoubtedly, the greatest care must be used in the exercise of this authority. If party politics are suffered to be mingled with the system, its whole efficiency will be lost, and the more liberal the State may choose to be, the more mischief it will certainly do. No political functionary of the government should be entrusted with the Ministry of Public Instruction, if such an office should be created. The whole administration of the system should be in the hands of literary men, actually devoted to literary avocations or pursuits.

country entered with each other, when they agreed to form themselves into republican communities, in which they were to govern themselves by their elected representatives, that a high standard of education for the entire mass should be adopted and sustained; simply because without it, as is universally conceded, the mode of government contemplated could not and cannot be supported. This view of the original compact into which the people entered in their individual capacities, involves two or three important particulars, which it is necessary to notice. In the first place, there is a positive political obligation resting on every individual, having the proper opportunity, to submit himself to instruction; and the force of this obligation in practice, if submitted to, would carry every child to school under parental care and authority. Without such instruction, there can be no intelligent performance of that high political duty—that solemn part in the public administration of the government—which every elector is called on to perform. And as every other man has an interest in the manner in which this duty is discharged, as well as the individual performing it, the obligation to submit to instruction is a perfect one, as to which the community may and is bound to demand satisfactory evidence that it has been faithfully observed.* Of course, I shall not be thought guilty of the absurdity of supposing that any man or child can be forced to receive instruction; but I would have it understood that I am clear in the opinion, that failure or refusal to meet this obligation should involve this certain consequence, that the individual must rest satisfied with the privileges of an ignorant citizen, which he can always enjoy with safety to the republic, but must not aspire to the higher privileges and immunities of an instructed one.

There is now another particular to be mentioned, connected with the one just noticed. There is a positive political obligation resting on every individual, not only to submit to instruc-

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* If the public could be agreed to exact evidence of the due qualification of electors in this respect, there would, I believe, be no difficulty whatever in devising a just, effective, and unoppressive mode of obtaining it.

tion, but, if able, to pay for the expense of it; and if either unable or unwilling to do so, to permit the community to provide for his education at the public expense. This involves, in the cases supposed, a reciprocal obligation on the part of the State, or the community, to make such provision. In case of inability, this duty on the part of the public is universally acknowledged. When individuals are found unwilling to meet the necessary expenses of instruction, the like duty is actually practiced, though it is not so apt to be confessed; while the just benefit which ought to flow from it is generally defeated by a policy, which begins with caution but ends in parsimony. To estimate truly the force and spirit of this obligation, it should be recollected that the class of unwilling citizens, by the very distinction we make, does not include the unable, but is made up of persons of some substance, which may always be reached by a proper system of taxation. The chief resource of that great corporation which we call the State, is in the individual property of the citizens, who are the corporators; and of itself it can possess no property but each corporator has an interest in it. When, therefore, the State undertakes to prepare a foundation for popular education, and to furnish the means for its support, it can apply nothing to this object which is not the property of the public—a property to which every man of substance directly contributes, or in which he has an interest without direct contribution. It is easy to see, from this view, that the class of the unwilling, though they may refuse voluntarily to make any sufficient provision for their own or their children's education, cannot wholly relieve themselves of this primary obligation. The State, or the community, is permitted to meet the exigency in its own way, but in doing so it takes care to coerce the unwilling, as far as practicable, into a just contribution.

The detail of administration with us is provided for, by the division and subdivision of the people into distinct and, in many respects, independent communities. We have counties, and towns within counties, and cities and villages—all being distinct political communities, and exercising, within themselves, larger or more limited powers of administration. It is

through these divisions, that popular education is, and ought to be, chiefly carried forward. The one hundred thousand dollars furnished annually by the State for the support of common schools, does not exceed the thirteen hundredth part of the whole annual expense. The rest is furnished entirely through the medium of the county and town administrations, with the aid of tuition fees. The whole outlay for the construction of school-houses, in which more than two millions are invested, for the repairs of these houses, their furniture and their fuel, falls, self imposed, on the taxable property of the towns. Besides this, the same property of the towns, receiving the bounty of the State, is also twice taxed for the support of teachers; once by the administration of the county and again by their own.

Nothing can be more admirable than the foundation which is here laid for a system of adequate universal instruction. The principles really involved in it need nothing but that they should be carried into vigorous execution. There is a blending of authority with moral suasion, and of constraint with freedom, which is not only just in itself and adapted to our institutions, but belongs truly to the spirit of the age. The only fault I have to find is, that in the present state of the subject and in the present condition of the people, the authority is not exerted with sufficient steadiness and effect, while the moral force wants the aid of other and higher sanctions; that the constraint is too feeble, and the freedom too free.

Setting out with the proposition, which no man does or ought to doubt, that popular education of an elevated character is a work of indispensable necessity and obligation in our country, just as much so as the support of government itself, I see now no good reason why it should not be made a legal condition of the existence of every town in the State as a distinct corporation, that the necessary provision shall be made for primary instruction within it, according to its numbers, and according to the standard prescribed by public authority. Such provision would embrace the requisite buildings and their furniture and supplies, and so much for teachers' wages as would meet the probable deficiency in the funds for that object, after

applying the amount which may be received from the State and from the rate-bills of the pupils instructed. I see no hardship in insisting that no town should enjoy its privileges as such, which would not come up to this requisition; and that in such case, it should not be organized, or if organized, it should be dissolved, and annexed entire, or in parts, to such towns as would meet the condition.*

I am aware that propositions of this sort, which contemplate important changes, are apt to strike the minds of observers with alarm. But I know also that these monsters, which seem such when viewed at a distance, often undergo an apparent transformation, so that an aspect which was thought to be utterly terrific, is finally converted into a countenance of considerable beauty, when its features are brought under a near and calm inspection. I am not without strong hope that such may be the result with the subject in hand. I think it may be made to appear, that with the introduction of proper changes and improvements, our common schools may be supported, according to the elevated standard now contemplated on all hands, even without any additional burthen on the people which would for one moment be made the subject of serious complaint.

My proposition of reform begins with the districts. There are not only too many of them, but they are out of all proportion to the exigencies of the case, on any plan of instruction whatever. There are upwards of 10,000 of them in the State for the accommodation of 540,000 children; an average of more than twelve in every town, and one hundred and eighty-one in every county. The average number of children in each school, actually instructed, does not exceed fifty. In Prussia, in 1831, there were 2,043,030 children instructed in 22,612 schools, or about ninety in each school. In Baden, an assistant school-master is not allowed, unless the number of scholars exceeds one hundred and twenty.

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* In cases where, from the scattered condition of the inhabitants, or other causes, the burthen of constructing school-houses, &c. would be too great, assistance should be rendered by appropriations of public money from the treasury of the State.

In considering the proposition to reduce the number of districts, two things must be regarded. First, how far they may be reduced without increasing the distance from school to an improper degree; and next, what number of pupils can be profitably instructed under the care of a single master.

If a school-house is so situated, that by far the greatest number may reach it in traversing half a mile, and the greater portion of the residue are within a mile, while a few only must come from a distance of a mile and a half, and by mere possibility a mile and three quarters, I shall assume that such house will properly accommodate its entire district; especially as I would propose that the common school system should not purport to accommodate any children below the age of seven years. This is the limit downwards in the Prussian system. Now it may seem strange, but examinations have satisfied me, that so far as territorial accommodation is concerned, eight at least out of every twelve districts in the State, (the average number now in each town,) may be dispensed with. I believe that nine could be with entire propriety; but I am quite clear that an average of four districts in a town is altogether sufficient.*

But this reconstruction of the districts will throw into each a much larger number of children to be committed to the care and instruction of a single teacher. The average number in each town being about six hundred and forty-three, the children in each district would average about one hundred and sixty. And as the districts must always be formed with a due reference to territorial convenience, there must of necessity, as at present, be more or less inequality in point of numbers, which may range perhaps between one hundred and twenty-five and two hundred. And the true question now is, can the largest number which, on this plan, may fall within a district, be profitably instructed in a single school and under a single master? For myself, I suppose there can be no hesi-

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* In Silesia, where one school frequently suffices for more than one village, the regulation is, that the school must not be distant from the village more than half a German mile, which is *two and a quarter British miles*. This is the distance in the flat country. In the mountainous parts it is less.—Dick. And *vide Note B*.

tation about an affirmative answer. There is a system of instruction, designed expressly to meet the exigencies of popular education, the practicability and superior excellence of which have been demonstrated by experiment over and over again, and to which, in this application of the plan, no sufficient or plausible objection, I believe, ever has been or can be urged—a system by which one competent man may carry on the instruction of two hundred scholars, and many more even, with about as much ease as he could otherwise instruct a class of ten, and with signal advantages in point of thoroughness and effect. I allude of course to the monitorial system. How is it, that so little has been done to introduce this method where it is most needed, and where alone it is fitted for great utility? If we wait for the people themselves, self-moved, or on account of some sudden illumination, to adopt this or any other great improvement, designed to work out their intellectual elevation, we shall wait forever and in vain. The impulse must come from without. Beginning, as it doubtless must, with the learned and the enlightened, yet it must be brought to bear on the multitude under the auspices and the sanctions of public authority.

I cannot avoid insisting on it, if it be really intended to elevate the standard of popular instruction in this State, to make the system universal, and *educate the people*, that some method like the one now suggested must be adopted and enforced. Can it be seriously expected by any one, after due reflection, that ten thousand school-masters, qualified after the new standard, can be furnished to our people within any reasonable period? Nay, would it not require twenty thousand to meet the demand of an increased population, long before the ten could be ready to take the field? And then, if the required number was actually forth-coming, does any man seriously believe that the people can be persuaded to meet the extraordinary expense of sustaining them? If so, he believes that they will voluntarily pay $3,700,000 for teachers' wages, instead of the $400,000 which they now pay; that each town, as an average sum, besides the double taxation now imposed, will pay $4,353; each of the twelve districts in a town $363;

and every child in a district, six dollars and eighty-four cents, on the rate bills for tuition fees! Is it not evident to the slightest inspection that this system is loaded with burthens which it is wholly unable to bear? The very naming of them is sufficient to break it down.

What remains then, but to give up the whole object in despair, or at once adopt a practicable and effective method, by which its entire accomplishment may be compassed within the limit of the means with which alone we can operate? At least, before we abandon the children of the republic to a doom of ignorance, and of consequence the republic itself to certain destruction, is it not better that any project which gives even a plausible promise of improvement and relief, should be subjected to examination, if not to trial?

By the one now suggested it is seriously believed, that three thousand competent men are enough to do the work of popular instruction for the four hundred and fifty thousand children found in our State between the appropriate common school ages of seven and fourteen.* If so, the whole expense of instruction, with salaries of $400 to the teachers, instead of the $70 which they now get, may be met with an outlay of $1,200,000. Of the sum to be paid in each large district for wages, ($400) the public monies now devoted to this purpose will furnish one quarter, provided only, that that part of the taxation on the property of the towns which is now voluntary, be made, as it ought to be, coercive and obligatory. An average tuition fee of one dollar and three quarters per year for each scholar will make up the residue of the sum. And if even this small amount should be found to be oppressive, especially in the case of the poor and of those of moderate means, relief might be easily had by an inconsiderable increase of the property tax, or a larger appropriation from the State—a measure about which, if necessary to the support of the system, all hesitation should be regarded as evincing a disposition to betray the mighty interests involved.

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* The number of children in the State between the ages of 5 and 16 is reported at 543,085 I suppose there are 100,000 between 5 and 7 and 14 and 16. The *legal* term of study in the primary schools of Prussia is from the age of 7 to that of 14.

It is impossible in this place that I should attempt to pursue the plan I have suggested into its details. There are advantages connected with it, which have not even been hinted at, and which must be left to be considered, when the merits and defects of the plan shall come to be discussed more at large, if, indeed, it shall be deemed worthy of any future thought or action whatever. I will only add now, my sincere and honest conviction, a conviction to which I have been brought after considerable reflection, and which has been confirmed by consulting the opinions of persons more intelligent on such a subject than I can pretend to be, that a plan of this sort is not only practicable, but commends itself in an especial manner to the judgment of all, because it is the only one that is practicable, on account of its superior efficiency and economy, to compass the great object in view—which is, the universal instruction of the people after an advanced and elevated standard of education.*

I have spoken in general terms of our educational and literary system, in connection with the subject of endowment and support. The time which I have found it necessary to consume in treating of a single branch of that system, leaves me no choice but to content myself with the most cursory and hasty glance at the remaining parts of it.

No great reforms are ever made without great changes. Where a business is begun wrong, it will generally continue to go wrong, and the attempt to mend it by patching, is like adding new cloth to an old garment. We can never be sure that we are prepared to remedy an evil till we have struck the foundation of it. Happily, in most cases, the bottom is much sooner reached than is commonly imagined by those who are used to see nothing but what appears above the surface.

As I regard the body of learning in any country or State as an entire thing, I could not contemplate the remodelling of one limb, without proposing to bring the other parts of the frame into proportion and harmony with it. The portions of our general educational plan above that of primary instruc-

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* Note C.

tion, seem to me to occupy false positions, not only in relation to an elevated standard of popular education, but in regard to learning generally as a system. When in this country we erect a literary institution, and call it a university, we seem to imagine that we really have something resembling a German establishment of that denomination. So we establish colleges, and, misled by a name, we come near spoiling these valuable seminaries, by attempting a miserable imitation of those learned republics which bear that name at the English universities of Oxford and Cambridge. It does not seem to be at all understood what kind of institutions these latter are, or the purposes they are designed to answer. The more ancient of them were at first monasteries; and to this day each college is a distinct community, living under a head in particular buildings, and still in some degree after the monastic mode of life. Every thing in them partakes of the spirit of this origin: police, discipline, costume, habits, the subjects of study, and the marshalling of ranks, classes and degrees. The course of education was originally prescribed with a special reference to the great object of their foundation—that of supplying and training candidates for orders in the established church: for with this national establishment both universities were, and still are, intimately blended. It was in this way, and under the mighty influence of these very universities, that classical literature obtained that undue ascendency which even yet it preserves.

Now it seems to me plain, that in attempting to imitate the English colleges in ours, we have succeeded in copying their defects very exactly, while we have been utterly unable to approach to a rivalship of their excellencies. We bring the collegers together in particular buildings, and form them as nearly as possible into monastic communities, and instal ecclesiastics at their head.* We establish that sort of discipline which com-

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* I trust I shall not be thought wanting, either in proper respect or courtesy to the clergy as a body, if I insist on it, as I certainly do, that there is nothing in their professional education or character, which, at this day, *particularly* qualifies them to take the charge and management of our higher seminaries—at least to the exclusion of all other persons.

mends itself to all tyrants, because it delights to retain and exercise an arbitrary power and control over the minds and bodies of men, long after they are, or might be, fitted to govern themselves, or should be managed only by the exhibition of moral motives and moral restraints. We have even, in some instances, carried the act of imitation so far, as to create the most odious distinctions of rank and degrees, where none could exist in nature or reason, by reducing one class of students to the condition of servants, to fetch and to carry, and to perform the most menial offices for their fellow students of another class.* Nor have we been content with imitations in matters of police and discipline only. The same servile spirit is manifest enough, not merely in the adoption of the same methods and subjects of study, for this was originally excusable enough, but in the astonishing pertinacity with which we adhere to them. At a time when the world possessed no learning but what was contained in Latin and Greek, it was well enough to make a knowledge of these languages the test of learning. But, at this day, it does not seem to be quite so clear a proposition, that the lay members of a college must study these tongues, because it is proper that such as are destined for holy orders should do so. To hear an individual read or quote a scrap of Greek or Latin at this day, is not half as good evidence that he is a man of learning, as the ability to read the first verse of the fifty-first psalm was, in the time of Edward the First, that the reader was actually a clerk in orders, and therefore a learned man.

I have referred to the false position and the errors of our collegiate system, in order that what I have to say of these institutions, in connection with the subject of endowment and support, may be correctly understood. We must learn to form a just estimate of our colleges, of the true position they occupy in the general system of education, and what may be reasonably expected to be accomplished by them, before we can be prepared to offer an opinion how many of them should

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* These odious regulations existed for a very long period in Yale college, and, I believe, elsewhere; and the remains of this abuse are still to be seen.

exist, to what extent they ought to be endowed, in what manner they should be conducted, and how they may be supported. I regard them as occupying a rank in the educational scale, certainly not above the German gymnasia, though, with the introduction of improvements in subjects and methods, they may, undoubtedly, maintain an equal elevation, and answer a similar purpose. Great mischief has been done by allowing it to be supposed that the colleger was to traverse the curriculum and come out a perfect scholar. So far is this from the fact, that nearly every college graduate in the land, who is now a scholar, will bear willing testimony, that not even the true fundamentals of his scholarship were laid there, but that he constructed them afterwards with his own hand. What a college ought to be, and is, or will be, when properly conducted, is this, and nothing more: A place where a young gentleman may be inducted into a thorough acquaintance with the elements of the sciences and of learning generally, so that entering it at fourteen, he may leave it at sixteen, eighteen or twenty, according as his previous preparation and his actual progress may have been, amply fitted for many of the employments of active life, or prepared to work out his own advancement in knowledge on the foundation already laid, or to enter with advantage on professional studies, or, finally, to join a university, properly so called, and, with the aids there afforded, make himself master of the deepest secrets which science or philosophy has to unfold.

In this view of the business of college instruction, it must be evident that we have two kinds of schools which now interfere injuriously with each other. I mean academies and colleges; and, I am serious when I say, that a just equality requires that we shall call the better order of our academies, colleges, or that our colleges should be called academies. It is perfectly well known, for example, that no college in the State can turn out scholars more thoroughly or more extensively instructed, than the Albany academy is prepared to do. And in passing, I cannot forbear to urge on those who have charge of this institution, that, in justice to it and to this city, they will not suffer another year to pass without an effort to

cause this academy to be incorporated as a college, with the power of conferring degrees.* There is not one good reason why this should not be done, while there are many considerations, if we had time to discuss them, why such a measure should not be delayed.†

The position which our academies assume to occupy is that of a middle place between the primary schools and the colleges; somewhat after the manner of the grammar schools in Germany, or possibly they may have been thought to resemble the English middle schools. The uses which they ought to answer with us are these: to afford to one class of scholars, who are here to complete their scholastic education, a grade of instruction above that found in the common schools, and to act as a preparatory school for another class who are to ascend to the colleges. But the misfortune is, that they have not confined themselves to their legitimate sphere. They have been extended in two directions; upwards towards the colleges, and downwards towards the common schools. Now I suppose it to be practicable to divide our entire list of public academies into two classes, and to arrange them so that one class, to the number required to meet the proper demand, shall become colleges in fact and in name, and the other class, so far as they are fit to be sustained at all as academies, shall take their proper stand between the common schools on the one side and the colleges on the other.

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* The view which I take of our colleges leads to the conclusion that this power —the conferring of degrees—should be greatly curtailed and limited in all these institutions. But, of course, while it is retained, each college should possess all the powers of every other. With the establishment of proper universities, if that should ever be effected, this power in the colleges, at least as to all the higher degress, should cease.

† It is this power of conferring degrees and the name of a college, which alone are wanting to give to the Albany academy an equality with the other institutions of that denomination in and out of the State, in standing and character. Why should not Albany furnish to its own young men the means of obtaining the baccalaureate degree at home, instead of compelling them to seek for it elsewhere? Indeed, with proper exertions, Albany might be made the high seat of learning for the State, and, in time, even attract crowds of visitors from a distance to enjoy the advantages of her well endowed schools. The fame of a circle of distinguished professors might advance her prosperity beyond all the successes of commerce.

It is probable that at least one-third of the whole number of pupils, male and female, now in what are called academies, would belong to the common schools, as soon as these should be furnished with teachers according to the advanced standard. That department of the institution then, where such pupils are gathered, if still retained in connection with the academy, should be denominated the common school, and should be that of the common school district in which it is situated, and receive support after that method; or otherwise, these pupils should be dismissed altogether to the common schools. In no case should students be admitted to an academy under ten years of age; nor should instruction in classical language be attempted before the age of twelve—it being all the while carefully recollected, that these middle schools are designed partly for the instruction of those whose public school education is to be finished in them, but on a grade above the level of primary instruction, and partly as schools of preparation for the colleges. In this way, those who go from them into the world, may stand some chance of being well instructed in useful knowledge; while those who seek the colleges from them, will do so with superior advantages for the pursuit of scientific study and sound learning, and at the same time will enter, if they design to do so at all, quite early enough on the study of classical language and literature. What remains in this proposed disposition of the academies is, to repeat the suggestion, that the better order of them shall be turned into colleges, to the number really required; dismissing, of course, all pupils which properly belong in the improved common schools, but retaining perhaps, if that should be thought advisable, in a preparatory department, scholars from the age of twelve years, who desire to begin in them a course of instruction in science or in classical learning.

It must be borne in mind, all the while, that learning, as a system, never sustains itself; and there is no ground to hope it will ever do so, until the time shall come when the whole population of a State, above the period of infancy, shall be thoroughly instructed and enlightened. The great difficulty, therefore, is not in finding persons to be taught, but in finding

the means to defray the expenses of instruction. Charity and the government must divide the burthen between them; though I hold it to be the duty of the government to charge itself with the support of the system, receiving all the aid which charity may be pleased to bestow, but by no means leaving it to depend on her caprices. The plan must be made effectual to meet the vast purpose in view—that of universal illumination—which requires on the one hand an expenditure of the utmost liberality; a liberality which must be met on the other with the practice of a sound economy.

Now I do not call it good economy to build and endow an academy for the instruction of one or two hundred boys in the branches of a common school education, at an expense which would be sufficient to construct fifty school-houses on an improved model, where six or eight thousand children might be equally well instructed. Let individuals build and establish and support as many such private academies as they will. But they should not be adopted by the State as belonging to the public schools. The public academies should be sustained solely to supply a grade of instruction decidedly above that of the common schools, though below that of the colleges, and with a view, in all of them, to the education of teachers. In this way, if I do not mistake, a considerable saving may be made.

A worse error than the one just mentioned, in my judgment, is committed in the establishment of colleges; by expending vast sums of money in the construction of buildings designed for the accommodation of the collegers as a monastic community. I deem this a practice to be utterly reprobated. It is as bad in point of government and morals, as it is on the score of economy. The buildings of a public college should furnish ample accommodations for the extensive collections which are to be employed in it as the aids of study, and abundant room for all the exercises of instruction and exhibition. It should then supply apartments for a janitor, and nothing more. Situated, as it ought to be, in a city or well populated village, professors, tutors and scholars would find no difficulty in dwelling, as christians should do, in families, and mingled

among the inhabitants of the town. It is easy to see what advantage would be gained on the score of endowment, by reserving for necessary and more profitable uses, that flowing bounty which is now accustomed to become absorbed and fixed and useless, in the walls of a luxurious and extravagant college architecture.*

I am clear that the State ought to include within the number of its public schools, both colleges and academies; not merely for inspection by a Board of Regents, but as objects of a direct and substantial endowment.† There ought to be colleges for at least three thousand scholars, instead of the six or eight hundred now thus provided for. And as for the academies, a much smaller number than those which are now receiving State patronage might be prepared to accommodate twelve thousand scholars of both sexes with a high grade of instruction, instead of the fifty-five hundred, of all ages and conditions, who are found in them at present.

In relation to both kinds of institutions, it should be the first great duty of the State, to see that every one, which is recognized as belonging to the public foundation of schools, either by the aid of public funds or without them, should be suitably and liberally provided with buildings, library, apparatus, museum, and all the appointments of a well ordered and well endowed seminary of the grade to which it may belong. Until this is done, it is useless to expend money on teachers, for the mere promise of instruction which they can never afford. When the way is thus prepared, the next thing to be cared for is a provision for the wages of instruction, and, if necessary, the State should contribute to this object, as it now does. I have little doubt, however, that as soon as the public mind

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* It is not intended to object to good taste and generous expenditure in the architecture for literature; but brick and mortar and marble are not the most important things about a college. Besides, for the reasons suggested in the text, the buildings are much more extensive than necessary or profitable.

† It should be a settled rule with the State, adopting a system of endowment for the benefit of the whole community, never to appropriate a dollar to any educational or literary institution which has been established by or for a sect in religion, or a party in politics.

has had time to rouse itself to the measure of these new advantages, the wages of instruction may be fully met by the spontaneous demand. On this subject, it has suggested itself to me, that the connection of a learned society, (as a Lyceum or an Institute,) with every public college and academy, would lead to valuable and important results. These should draw into their support the learning, cultivation and taste of the town and the vicinage. The endowment of the seminary would at the same time be the endowment of the society; and the establishment of regular and permanent courses of lectures on literary and scientific subjects, on a strictly popular plan, to be conducted chiefly by professors and instructors, perhaps with occasional foreign aid, and open to all citizens for a moderate fee, would at once bring these institutions into a most happy communion with the body of the people, contribute to their immediate support, and prepare the way for the ultimate success and triumph of the system. It is in this connection, perhaps, better than in any other way, that scientific and literary associations may have the benefit of public aid and endowment.

It had been my purpose in the outset of my remarks, to offer to the consideration of the Institute a plan for such courses of lectures as I have here alluded to, to be conducted in this place under its control and supervision. Whatever of detail belongs to it, I must take another and a private opportunity to present.* At present, I can only say, the experiment has been tried with perfect success elsewhere; let it be tried here. This is the very place, and here are the very means, to test the value of the suggestion I have made. Let the application be made at an early day to turn the Albany academy into a proper college. Let the Institute offer to connect itself permanently with the college, bringing in the handsome capital which it possesses in its library, cabinet and museum, on equitable terms; and then let the Legislature be besieged by all the learning, and talent, and moral force, which can be enlisted in this behalf, to begin a great work, by setting here the

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* Vide Note D.

example of a liberal appropriation to complete the proper furnishing and endowment of the college and Institute. In the mean time, let the Institute, even with the means in possession, take in hand the business of preparation for the delivery of courses of lectures to be begun in the coming autumn—lectures which may be so conducted, I hesitate not to say, that at the end of eighteen months, a diligent hearer of the course, with ordinary capacity only, may have a sounder acquaintance with science and useful knowledge, than can be found in one out of twenty college graduates, who carry the evidence of their proficiency in a classical certificate under seal.

To complete the outline of a plan for a system of learning and public instruction in this State, it remains only for me to add, that it requires to be crowned with at least one great State University. This should be established here at the seat of government. We now have the NAME of a State university solemnly incorporated by act of the Legislature, but no university. To create one, in fact as well as in name, the State should not hesitate or delay to appropriate one million of dollars for its endowment. If we want a model, it may be found in Germany. Perhaps the most perfect is that at Gottingen.* And as for the million or more which might be necessary to endow it, let it be the business of the men of learning, by a concerted union of all their forces, to make the public authorities ashamed to refuse it. It is demonstrable, that without something of the sort, science cannot be kept fully alive in any country. If scientific speculation be not cherished and strengthened, her wing will flag whenever she attempts to gain the region of a higher and rarer atmosphere. The foot of ardent and noble discovery will tire and stumble, with none to cheer him on, and no aid towards clearing the obstructions from his untrodden path. If philosophy be not allowed

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* When this university was established, a building, then used as a gymnasium, was appropriated for the purpose of lecturing; and for a long time no other provision was made, either for the convenience of the students or of the professors: every one was to take care of himself as well as the state of the place would allow. To this university the town of Gottingen owes its prosperity.—London Jour. of Education.

implements, and materials, and opportunity, and leisure, she cannot mine, and elaborate, and build; cannot lay deep foundations, and raise heavy frame works, and carry up her structures to unwonted altitudes, to meet the visible glory which ought to rest on their summits in the sight of the people and of the nations.

To say that this service in the cause of learning may be expected from our colleges, is utterly to mistake their business and object, as well as their means. They are to conduct, what has been aptly termed, the gymnastics of education. They are, after all, in relation to learning in its exaltation and sublimity, nothing more than high preparatory schools. They are to fit and prepare the student to occupy an intelligent position in the class of the university professor. Mature in years, with a vigorous understanding, and in full possession of the elements of knowledge, he is thus made ready to wait on the ordinances of the university with singular profit, not to himself only, but reciprocally to the learned professor, and to the cause of science. They mutually cheer on each other, the one panting to follow wherever the other shall dare to lead. Every high demonstration is then understood; every lofty effort is appreciated; and in this way it is, that, by the influence of a common zeal and a common sympathy, they are enabled finally to ascend and stand together, professor and pupil, on the very heights of science.

It is believed that in no other way, than through the sustained efforts and the example of such a university, can the cause and the interests of true learning be properly subserved. It is through this medium alone that the standard of high scholarship is to be fixed. It is her example which is to prescribe, and regulate, and elevate, the methods and business of the schools set up for professional studies. She it is who is to give energy and efficiency to the labors of the voluntary associations formed for the promotion of learning, by furnishing to their boards a supply of active, zealous and competent members. It is in her ample and well furnished halls where are hereafter to be gathered those ardent spirits among us, who are now driven away to the deep wells of learning in other

countries, toslake that burning thirst of knowledge which can be satisfied nowhere in our own. And finally, it is she who must become the nursing mother of those noble sons of genius, who are to rise from their eminent position in professorial chairs, to the dignity and glory of original, profound, and distinguished authorship; and who, by themselves and by the scholars whom they form, are to create that atmosphere of learning, at once pure and luminous, which must envelope the whole land, in order to afford the proper element of life and breath, of health and of vigor, to the constitution and body of a safe and genuine philosophy.

Having completed, I am afraid by a very tedious process, this imperfect sketch of an extended system of public instruction and learning, and having insisted on the necessity of endowment by the State and under State authority, I have one word to say in conclusion to my fellow members of the Institute, of the relation in which, it seems to me, we stand to the subject we have been considering. I maintain, in the first place, that no spontaneous movement on such a subject, is to be expected from the body of the people. And I go further, and maintain, that even the government, no matter in whose hands the power may be, no matter what political party may be in the ascendant—even the government must not be expected voluntarily to turn from the care and pursuit of those measures, pressed on it from all quarters, which concern the interests of trade, and of agriculture, and of manufactures, and of internal improvement, and which are chiefly directed to aid in the creation of individual wealth and in the promotion of outward public prosperity—to turn from these voluntarily, and take up the interests of learning, originate the proper system, on a scale commensurate with its dignity and importance, and carry it forward to its consummation. On this subject, governments too, like the people, will act efficiently when acted upon, and not otherwise. Now I submit to the Institute, that it is peculiarly the business of those who, by their voluntary associations, make a public profession of their interest in the cause of learning and education, to begin the movement in this important matter. Let the learned societies of this

State establish correspondencies with each other, with a view to add the force of numbers to the force of argument; and, taking an example of wisdom, even from the enemies of law and order and morals, let us too agitate, and agitate, and agitate, in the cause of truth and of virtue, until our opinion shall form and become public opinion, with all the weight and authority of that mighty engine; and let us give no rest to the men of power among us, till we shall see the land redeemed from the vices of ignorance, bigotry, and superstition, and established under the reign of a wide-spread illumination; of a pure, exalted, and ennobling philosophy; and of a religion of undefiled and Christian simplicity.

NOTES.

Note A.

The following is the prescribed course of study in the teachers' departments, in the selected Academies:

1. The English Language.
2. Writing and Drawing.
3. Arithmetic, Mental and Written, and Book-Keeping.
4. Geography and General History combined.
5. The History of the United States.
6. Geometry, Trigonometry, Mensuration and Surveying.
7. Natural Philosophy, and the Elements of Astronomy.
8. Chemistry and Mineralogy.
9. The Constitution of the United States, and the Constitution of the State of New-York.
10. Select parts of the Revised Statutes, and the duties of Public Officers.
11. Moral and Intellectual Philosophy.
12. The Principles of Teaching.

This is a pretty formidable list; and, after all, I cannot help remarking what seems to me very singular, that it excludes Natural History—a subject which, of all others, should be the first to be introduced into our common schools—the very subject about which the faculties of the human mind may be most profitably employed in its earliest stages.

Note B.

As an instance of what may be done in reconstructing the districts, so as greatly to diminish their number, and yet accommodate the inhabitants, we may take a single county, say Cortland: This county has an area of 500 square miles, and has 24,000 inhabitants, and it has 168 school districts in eleven towns, and each district comprises only *three* square miles and a fraction over; and the boundary lines of each, supposing the district to be square and the sides equal, are only a mile and seven tenths in length.

Now if this was a square, as it is nearly, its sides would be 22.4 miles long; and if divided into 49 equal squares, so as to give that number of districts, instead of 168, each district would contain ten square miles and a fraction over, the sides of which would be three miles and a fraction in length, and the distance *from the remotest corner to a school-house in the centre, would only be about one mile and eight tenths*.

Note C.

The expense of school-houses and their furniture, including proper apparatus, models, specimens, books, &c., is an important item of consideration. If a higher grade of instruction is to be introduced, with improved methods, the *means* must be attended to.

If there must be 10,000 school-houses, as all should be after an improved model, I compute the expense necessary for putting the present houses in proper condition or supplying their places with new ones, at $225 each. This is equal to the original cost of the present class of houses, as estimated.

The account would stand then,

For 10,000 school-houses, $450 each,		$4,500,000 00
Furnishing " at $250 "		2,500,000 00
		$7,000,000 00
But if 3,000 school-houses will accommodate the children of the State, then a great saving may be made, and yet houses of a superior description be constructed, making use, as far as possible, of those now existing. Thus:		
3,000 school-houses, at $500 each,	$1,500,000 00	
Furnishing " at $250 "	750,000 00	
		2,250,000 00
Difference,		$4,750,000 00

This comparison shows, moreover, that the whole expense of elegant and well furnished and well found school-houses, for the reduced number of districts, would not exceed the outlay which has actually been made in the State for those miserable apologies for school-houses which now exist. They are estimated to have cost about $2,250,000.

The expense of supplying three thousand school-houses with fuel, in the place of 10,000, is another item which ought to be remembered. This has been estimated at $10 each, or $100,000 for 10,000 houses. If we allow $20 for each of 3,000 improved houses, it will give $60,000.

The annual expense of school books for 531,240 scholars, has been estimated at 50 cents each, or $265,620. Perhaps, on any plan of instruction, this is a moderate estimate; but it is proper to remark, that one great advantage to *the poor* in the *monitorial mode* is, that almost no expense *need* be incurred for books.

Note D.

Plan for a course of Popular Lectures.

Let the Institute take this matter into its own hands, and furnish the lectures from its own members, with such aid as it may see fit to employ.

I. The courses should embrace all the most interesting branches of *natural science*.

(1.) The Natural History of Animals. (Zoology and Physiology.)

(2.) The Natural History of Plants. (Botany.)

(3.) The Natural History of the Earth. (Geology.)

(4.) The Elements of Natural Objects. (Chemistry.)

(5.) *Man*, considered as a physical, living, moral, and intellectual being. (Anthropology; including Anatomy, Physiology, and Psycology.)

(6.) The Properties and Laws of Integrant Matter. (Natural Philosophy; including Mechanics proper, Acoustics, Hydraulics, Hydrostatics, Pneumatics and Optics.)

(7.) The application of the Laws of Matter to the Solar System. (Astronomy.)

To these might be added, if deemed advisable, Lectures on History, on American and English Literature, on Law, &c.

II. The number of Lecturers for the courses on Natural Science need not exceed *four*.

One for Zoology and Botany.
One for Geology and Chemistry.
One for Anthropology.
One for Natural Philosophy, including Astronomy.

III. The time of the courses.

Each subject might occupy from 20 to 30 lectures, and *two* lecturers might occupy a *season* of four to six months.

So, the *first winter course* might be occupied with Man, Geology and Chemistry. The *summer course* might take up Zoology and Botany.

And the second winter course might go through with Natural Philosophy, including Astronomy.

IV. The manner of the lectures should be with studied simplicity.

To secure this, persons should be admitted, (as from the academy, &c.) as young as 12 years of age. The lectures need not, however, be puerile, for this reason. They should embrace only an *outline* in each case, taking care that each step taken be made familiar before the next is attempted. Visible illustrations, and repetitions should be employed. The classes should have a *thorough knowledge* of the subject as far as the lecturer goes, so as to be able to build for themselves on that foundation. There should be no *display* of learning; no *quackery*, and as little use of *technical terms* and *mystic phrases* as possible. The great error of instruction on these subjects, (and all others,) is attempting too much. *Learning* on any subject is only to be had after a life of devotion to that subject. Here the object should be to furnish *useful* knowledge, to lay a good foundation, and create the taste and improve the capacity for further improvement.

V. *The ways and means.*

The whole should be done by the Institute, under the direction of a proper committee, or committees. It should employ the Lecturers, (as far as practicable out of its own members,) and pay them, together with all incidental expenses. The *means* may be found, it is believed, in the *sale of tickets*, and in the *sums received from visitors*.

Take, for example, the *first winter's course*. I suppose that 200 tickets may be sold for the distinct course of each lecturer, at $2 each ticket, and that $50 would be received from visitors at 2s each.

The receipts would then be,

For *Geology*, 200 tickets, at 16s, ...	$400 00	
Visitors at 2s. each, ...	50 00	
		$450 00
Chemistry, the like sums, ...		450 00
Man, the like sums, ...		450 00
		$1,350 00

Expenses:

Pay to lecturers, say,

On *Geology and Chemistry*, ...	$500 00	
Man, ...	300 00	
		800 00
Leaving, to cover incidental expenses, &c.		$550 00

The other courses might be sustained in the same way. The price of tickets for the *full season's course* might be $5, instead of $6. The plan would no doubt require *an effort*, but with an effort, it is believed it might be successfully carried forward.

I am indebted to an account of the successful operations of an association in Edinburgh, for a hint of the plan here suggested.

OFFICERS OF THE ALBANY INSTITUTE

FOR 1836.

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Comparative Variations OF THE BAROMETER —AT— ALBANY, FLUSHING L.I., MIDDLETOWN Conn and CINCINNATI OHIO.

March 21st and 22nd 1836.

Miller & Co.s Lith. 15 Broad St.

Middletown

Albany

Flushing

Montreal

Cincinnati

6 A.M. 7 8 9 10 11 12 1 P.M. 2 3 4 5 6 7 8 9 10 11 12 1 A.M. 2 3 4 5 6 7 8 9 10 11 12 1 P.M. 2 3 4 5 6

.250 .240 .230 .220 .210 .200 .190 .180 .170 .160 .150 .140 .130 .120 .110 .100 .090 .080 .070 .060 .050 .040 .030 .020 .010 Inch

Mean Line.

Inch .010 .020 .030 .040 .050 .060 .070 .080 .090 .100 .110 .120 .130 .140 150 160 .170 .180 190 .200 .210 .220 230 .240 .250 .260 270 280 290 300

Cincinnati

Montreal.

Albany

Flushing

Middletown.

ART. IX.—*Report of the Committee appointed to continue the* METEOROLOGICAL OBSERVATIONS, *on the 21st of March, June, September and December.*

Accepted November, 1836.

The committee having delayed their report of the observations made in June, in the hope of receiving additional reports, until the beginning of September, determined to omit presenting them to the Institute, or having them published, until they could add to them the observations for September. It will be seen by the tables annexed, that the number of observers who are willing to contribute to this collection of materials is considerably increased; and the committee entertain the hope, that as the plan becomes more generally known, it will induce additional observations.

The tables of observations made by Sir John F. W. Herschell, for December, 1835, and March, 1836, have been included, as, in addition to the interest which would naturally be felt in examining observations made at the southern extremity of Africa, they possess the higher interest of being the work of the distinguished individual by whom this system of periodical observation was suggested. The Actinometer which is spoken of in his tables, is an instrument invented by him, for the purpose of ascertaining the amount of solar radiation. A description of it, and the mode of using it, may be found in the Report of the Transactions of the Third Meeting of the British Association for the Advancement of Science.

MATTHEW HENRY WEBSTER,
PHILIP TEN EYCK,
JOHN V. L. PRUYN,
HORACE B. WEBSTER,
Committee.

TABLE I.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Royal Society, Somerset House, for 37 *successive hours, commencing* 6 *A. M. of the* 21*st of June*, 1836, *and ending* 6 *P. M. of the following day.* (*Greenwich mean time.*)

Lat. 51° 30′ 49″ *N.; Long.* 0° 5′ 47″ *W.*

By Mr. I. D. Roberton, Assistant Secretary Royal Society.

Hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Rain in inches.	Wind.	REMARKS.
6 A. M.	30.017	64 2	57 6	....	SW	Cloudy; very light wind.
7	30.031	65 2	58 9	....	WSW	" "
8	30.035	65 6	60 2	....	"	Overcast; light wind.
9	30.033	66 2	60 6	....	W	" "
10	30.031	66 2	59 6	....	SW	Overcast; very light rain and wind.
11	30.018	66 0	60 2	....	"	" " "
12	30.010	66 3	62 4	....	"	" " "
1 P. M.	29.996	68 2	67 8	....	"	Fine light clouds.
2	30.002	70 0	69 3	....	"	Cloudy; light wind.
3	30.005	70 4	66 4	....	"	" very light rain.
4	30.008	70 3	66 9	....	"	" "
5	30.004	70 2	66 3	....	"	" "
6	30.014	69 6	66 4	....	"	" "
7	30.000	68 9	65 4	....	"	" "
8	29.990	68 3	64 2	....	"	"
9	29.986	67 3	62 7	....	"	"
10	29.978	66 7	61 9	....	"	" light wind.
11	29.976	66 3	60 7	....	.....	" "
12	29.966	66 0	60 3	....	.....	" light rain.
1 A. M.	29.948	65 8	59 9	....	.....	" "
2	29.932	65 6	59 4	....	.....	" "
3	29.920	65 4	59 2	....	SW	" "
4	29.924	65 3	59 0	....	"	" "
5	29.932	65 4	59 3	....	"	" "
6	29.934	65 5	60 3	....	"	" "
7	29.942	66 0	60 3	....	W	" "
8	29.946	66 2	61 5	....	S	" light wind.
9	29.950	67 3	63 2	.094	S var.	" "
10	29.950	68 2	63 4	....	S	" "
11	29.950	68 5	64 2	....	"	" "
12	29.946	68 7	62 9	....	"	" "
1 P. M.	29.940	69 4	64 5	....	"	" "
2	29.927	69 2	62 7	....	S var.	" "
3	29.928	68 8	63 6	....	"	Overcast; very light rain and wind.
4	29.911	68 6	63 6	....	SSW	" " "
5	29.895	68 5	63 4	....	S var.	" light brisk wind.
6	29.883	63 3	63 0	.016	S	" "
Mean.	29.969	67.4	62.5	.110		

Instruments and position same as in December.

TABLE II.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Albany Institute, Albany Academy, for 37 successive hours, commencing 6 A. M. of the 21st of June, 1836, and ending 6 P. M. of the following day.

Lat. 42° 39′ 3″ N.; *Long.* 73° 46′ 38″ *W.*

By a Committee of the Institute.

Hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Dew point.	Rain, inch.	Direction of wind.	Force of wind.	REMARKS.
6 A. M.	29.838	54°	53°50	52°	...	NE	very li't.	Overcast; slight rain.
7	29.843	56	55	53	...	.....	calm.	"
8	29.845	57	55	54	...	WNW	very li't.	" cls. moving W.
9	29.855	57	55 50	53	...	"	"	" slt. rain "
10	29.847	60 00	56 25	54	...	NW	light.	" " "
11	29.856	62 50	61 50	56	...	N	very li't.	" "
12	29.846	62 50	60	54	...	WNW	"	" "
1 P. M.	29.842	62	57 75	56	...	NW	"	" " "
2	29.847	62 00	59	56	.02	"	"	"
3	29.816	62 50	61	54	...	E	"	"
4	29.841	62 50	60	56	...	"	"	"
5	29.846	62 50	59 50	54	...	"	"	"
6	29.845	61	58 50	53	...	"	"	"
7	29.855	59	56 50	52	...	"	"	"
8	29.865	57	55 50	54	...	"	"	"
9	29.905	57	55	53	...	"	"	"
10	29.933	56	54 50	52	...	S	sc. perc.	"
11	29.938	56	53 75	52	...	"	"	"
12	29.915	55 00	53 50	52	...	"	"	"
1 A. M.	29.910	57	55	53	...	"	"	"
2	29.912	56 25	55 75	53 50	...	"	"	"
3	29.883	56	53	54	...	"	light.	" cls. breaking.
4	29.894	56 00	53	52	...	NW	"	"
5	29.910	55	52 50	51	...	"	"	" " cy. cir. in E
6	29.935	56 75	55	53	...	"	"	"
7	29.930	61	58	52	...	NNW	"	" cls. ass. app. cu.
8	29.929	65	59	50	...	ENE	"	" thin cir. overh'd;
9	29.941	66 50	61 50	50	...	NE	"	" [cum. in hor.
10	29.955	69 50	68	52	...	SE	"	"
11	29.934	67	63	53	...	NW	"	"
12	29.924	71 50	66	52	...	NNE	"	"
1 P. M.	29.930	72 50	67 50	51	...	"	"	"
2	29.943	67 50	63 50	52	...	WSW	"	"
3	29.949	67	65	52	...	W	"	"
4	29.958	67 50	65 50	52	...	"	"	"
5	29.967	66	63	54	...	SE	"	"
6	29.977	64	61	54	...	"	"	"
Mean.	29.896	61°17	58°55	53°12	.02			

Instruments and position same as in March. Time ascertained at noon, on the 16th, by a transit instrument.

TABLE III.

METEOROLOGICAL OBSERVATIONS

Made on Cape Diamond, Quebec, Lower Canada, commencing 12 ***M.*** *of the* 20*th* ***June,*** 1836, *and ending* 12 ***M.*** *of the* 22*d,* ***taken at three hour intervals.***

Lat. 46° 48′ *N.; Long.* 71° 15′ *W.*

By J. WATTS, Superintendant of Telegraphs.

Hours of observa.	Barometer.	Attached Ther.	Detached.	Wind.	Velocity in miles per hour.	REMARKS.
20th						
12	29.90	....	70	perfectly calm	.....	Cloudy.
3 P. M.	29.91	....	69	"	.....	"
6	29.91	....	65	"	.....	"
9	29.95	....	54	"	.....	Cirro cumulus.
12	29.96	55	54	"	.....	"
21st						
3 A. M.	29.98	55	54	Unsettled.	.....	"
6	29.99	55	55	ENE	28	Cloudy; clearing in various parts.
9	30.02	58	62	NE by E	33	" " "
12	30.04	62	67	"	33	A thin scud.
3 P. M.	30.04	62	62	NE by E SW by S	20	Cloudy.
6	30.04	59	56	NE by E SW by S	20	"
9	30.05	55	52	S NW by W	20	A thin scud.
12	30.05	52	51	S NW by W	20	Clearing about the zenith; cloudy at horizon.
22d						
3 A. M.	30.05	52	50	NW by W	2	Clearing.
6	30.06	....	51	NE ½ N	11	Clear.
9	30.06	....	60	"	20	"
12	30.06	....	69	ENE	24	"
Mean.	30.004	56.5	59.17			The cistern of bar. is 330 ft. above level of St. Lawrence at ½ ebb.

This barometer has no neutral point. When compared with Mr. McCord's, in May last, it stood .11 higher. The true mean would therefore be 29°894, which, corrected for temperature, would make 29°835.

When a wind is stated thus. $\frac{S}{NW\text{ by }W}$ it signifies that the upper current is S and the lower NW by W.

TABLE IV.

METEOROLOGICAL OBSERVATIONS

Made at Montreal, Lower Canada, for 37 successive hours, commencing at 6 A. M. of 21st June, and ending 6 P. M. of the following day.

Lat. 45° 30′ N.; Long. 73° 22′ W.

By J. S. McCord, Cor. Sec. Natural History Society, Montreal.

Hours of observa.	Barom. ap par. height	Attached Ther.	External Ther.	Dew point.	Direc. of wind.	Force.	REMARKS.
20th							
9 A. M.	29.920	65	57	42	N	0	Cloudy.
9 P. M.	29.916	64	63	....	NE	0	"
21st							
6 A. M.	29.924	65	53	....	E	0	Rain; commenced at 5 A. M.
7	29.930	65	53	....	"	0	" light.
8	29.932	65	53	....	"	0	" "
9	29.940	64	55	....	"	0	" steady.
10	29.948	64	55	....	"	1	" "
11	29.952	64	55	....	"	1	" "
12	29.950	64	54.5	....	"	1	" "
1 P. M.	29.950	64	53.5	...	"	2	" heavy.
2	29.950	65	54	....	"	1	" diminishing.
3	29.946	65	53.5	...	"	1	" drizzling.
4	29.960	65	53.5	....	"	2	" " clearing little in E.
5	29.950	64.5	54	....	"	2	Ceased raining; clouds driving fast
6	29.950	64.5	54	....	"	2	Cloudy. " " [& high.
7	29.950	64.5	54	....	"	1	" all over the horizon.
8	29.950	65	54	....	"	1	" " "
9	29.968	65	55	....	"	1	" " "
10	29.968	65	55	....	"	1	" " "
11	29.968	65	54.5	....	"	1	" " "
12	29.960	65	54	....	"	1	" " "
22d							
1 A. M.	29.952	65	53	....	"	1	" " "
2	29.952	65	53	....	"	1	" " "
3	29.950	65	52	....	"	1	" " "
4	29.950	65	52	....	"	1	" " "
5	29.980	65	52	....	NE	1	Rain.
6	29.984	65	53	....	"	1	Drizzling.
7	29.984	65	53.5	....	"	0	Cloudy.
8	29.990	64	56	....	"	0	" breaking in the E.
9	29.982	64	60	56	E	1	Clearing.
10	29.990	63.5	60	....	"	1	"
11	29.992	63.5	61	54	"	1	Cloudy.
12	29.992	64	62	....	"	1	"
1 P. M.	29.980	63.5	63	52	"	1	Blue sky appearing; clouds light &
2	29.968	64	64	....	"	1	" " " [drifting.
3	29.958	64	65	53	"	2	" " "
4	29.958	64	66.5	....	"	2	" " "
5	29.964	64	65.5	51	"	2	" " "
6	29.970	64	65	....	"	2	" " "
Mean.	29.960	64.49	56.33	53.2			Bar. corrected for cist. cap. and reduced to 32° Fah. 29.928. Rain .4 in
23d							
9 A. M.	30.036	64	61	55	E	1	Clear.
9 P. M.	30.022	66	64		S	1	"

Instruments and position same as in December.

TABLE V.

METEOROLOGICAL OBSERVATIONS

Made at the Institute, Flushing, L. I., for 37 successive hours, commencing at 6 A. M. of the 21st of June, 1836, and ending at 6 P. M. of the following day.

Lat. 40° 44′ 58″ N.; Long. 73° 44′ 20″ W.

By Prof. C. GILL.

Hours of observa.	Barometer.	Attached Ther.	Thermom.	Wet bulb Ther.	Winds, from.	Clouds, to.	Strength of wind.	REMARKS. Storm began at 2 P. M. 20th, with slow driz. rain, during eve. rained hard, thu. & li'g.
6 A. M.	29.81	61°	53 50	51 75	NE	SW	brisk.	Dark clouds and rain.
7	.82	60	53 75	52	"	"	"	" "
8	.80	58	54 25	52 25	"	"	higher	" "
9	.78	57	54 50	52 50	"	"	high.	" "
10	.79	58	55 25	53	"	"	"	Storm end. 10 3-4 A. M. 1.85
11	.81	59	56 25	54	"	"	less.	inches rain since 7 P. M.
12	.81	59 50	57 50	55	"	"	brisk.	
1 P. M,	.82	59	59	56	"	"	fresh.	Grey clouds overspread.
2	.82	58	59 25	56 25	"	"	gentle.	" "
3	.83	60	60	57	"	"	fresh.	" "
4	.83	60	60	57	"	"	"	" "
5	.83	60	58	55	"	"	gentle.	" "
6	.84	60	57 25	54 50	"	"	"	" "
7	.86	60	56 75	54	"	"	"	" "
8	.87	59 50	57 25	54 50	"	"	"	Driz. rain between 7½ and 8.
9	.88	59 50	56	53	"	"	"	Clouds partially breaking.
10	.87	59 50	54	51 50	"	"	fresh.	" "
11	.89	59	53 25	50 50	"	"	"	Dark clouds dropping rain.
12	.87	59	52 50	50	"	"	"	" "
1 A. M.	.88	59	52 50	49 75	"	"	"	Dark clouds.
2	.87	59	52 50	49 50	"	"	brisk.	"
3	.88	59	52	49	"	"	"	"
4	.89	59	51 50	49	"	"	"	"
5	.92	60	51 50	49	"	"	gentle.	"
6	.93	60	52 50	49	"	"	brisk.	Dropping rain at intervals.
7	.95	60	52 75	49	"	"	"	" "
8	.94	59	58 50	54 50	"	"	gentle.	Clouds breaking.
9	.94	59	59 75	56 25	"	"	fresh.	" overspread.
10	.94	59	61 50	57	"	"	gentle.	"
11	.95	59 50	63 50	59	"	"	light.	"
12	.95	60	64	57 50	"	"	"	"
1 P. M.	.95	62	67	61 50	"	"	gentle.	Sun app. at intervals.
2	.96	62	64	58	"	"	"	" "
3	.96	62	63 50	59	"	"	light.	Clouds again spread.
4	.95	62	64 25	60 25	"	"	"	" "
5	.95	62	63	59	SE	"	"	" "
6	.96	62	61	57 50	"	"	"	" "
Mean.	29.854	59 74	57.39	54.14				Range of bar. 11 inches; do. thermometer, 15½°.

The barometer is a leathern bottomed instrument of Pike's construction, and the observat.ons are precisely as they were read off from the instrument.

Height of barometer above low water mark in Flushing bay, 54 feet.

TABLE VI.

METEOROLOGICAL OBSERVATIONS

Made at the Wesleyan University, Middletown, (Ct.) for 37 successive hours, commencing at 6 A. M. on the 21st of June, 1836, and ending at 6 P. M. of the following day.

Lat. 41° 34′ 43″ *N.; Long.* 72′ 39′ *W.*

By Prof. A. W. Smith.

Hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Dew point.	Winds, direction.	Strength.	Clouds, kind.	Direction.	Weather.	Rain in inches.
6 A. M.	20.566	56	50	48	NE	fresh.	nimbus.	SW	cloudy	
7	29.578	56 5	50	48	"	"	"	"	rainy.	0.01
8	29.570	56 5	50	49	"	"	"	"	"	0.06
9	29.590	56 5	51	49	"	"	"	"	"	
10	29.588	56 5	51 5	49	"	"	"	"	"	
11	29.588	56 5	52	50	NNE	"	"	"	"	
12	29.583	57	52 5	51	"	"	"	"	"	
1 P. M.	29.573	57	52 5	50	"	"	"	"	"	0.01
2	29.583	57	52 5	52	N	"	"	SSW	"	0.01
3	29.583	57	53	51 5	NNE	"	cu. strat.	"	cloudy	.01
4	29.580	58	54	51 5	"	"	"	"	"	
5	29.591	57	54	48	"	brisk.	"	"	"	
6	29.595	57	53	48	"	"	"	"	"	
7	29.613	56	51 5	49	"	"	"	"	"	
8	29.626	56	51	48	"	"	"	"	"	
9	29.643	55 5	50 5	46	"	fresh.	stratus.	"	"	
10	29.664	55	50	46	"	"	"	"	"	
11	29.654	55	49 5	44	N	brisk.	"	"	"	
12	29.646	54 5	49 5	44	"	"	"	"	"	
1 A. M.	29.647	54	49	44	"	fresh.	"	"	"	
2	29.647	54	49	44	"	"	"	"	"	
3	29.647	54	49	44	"	gentle.	"	"	"	
4	29.647	54	48 5	45	"	"	cu. strat.	"	fair.	
5	29.657	54	49	45 5	NNE	"	stratus.	"	cloudy	
6	29.672	54	50	46	"	fresh.	"	"	"	
7	29.681	55	51	47	"	gentle.	"	"	"	
8	29.694	55	52	46 5	"	"	cu. strat	"	"	
9	29.698	56	53 5	48	"	"	"	"	"	
10	29.701	56	54 5	48	N	"	"	"	"	
11	29.706	56	57	47	"	"	"	"	"	
12	29.700	58	59	47	"	"	"	"	"	
1 P. M.	29.700	58	59	48	NNE	light.	stratus.	"	"	
2	29.707	59	59	48	"	very li	"	"	"	
3	29.717	59	58	48	N	"	"	S	"	
4	29.724	60	59	48	NNW	"	"	"	"	
5	29.729	60	59	48	NNE	"	"	SSW	"	
6	29.719	60	58	48	"	"	"	"	"	
Mean.	29.6434	56.39	52.74	47.62						0.10

The barometer used is a portable one, by Pike. The neutral point is not known; the correction for capillarity ,058. In reducing the column to 32° the expansion of mercury was assumed to be ,0001 for each degree. The attached thermometer is secured to the case near the vacuum chamber. The vernier was brought to the line of junction of mercury and tube. Height above the river, the same as in March. Daniell's hygrometer was used. The thermometer was that belonging to the hygrometer, detached for the occasion. Thermometer and rain gauge 24 ft. below the cistern of the barometer. Time determined by an obs. of the sun's alt.

TABLE VII.

METEOROLOGICAL OBSERVATIONS

Made by the Maryland Academy of Science and Literature, at their Rooms, Baltimore, for 37 successive hours, commencing June 21, 6 A. M., and ending 6 P. M. of the following day.

Lat. 39° 17′ *N.; Long.* 76° 36′ *W.*

By a committee of the Academy.

Hours of observa.	Barometer.	Attached Ther.	Thermom.	Wet bulb Ther.	Dew point.	Winds, from.	Clouds, to.	Strength of wind.	REMARKS.
6 A. M.	29.722	71	63	60 5	58	NE	.....	light.	Rain.
7	29.732	71	63	61	60	"	.....	"	"
8	29.747	72	63	61	60	"	SW	"	Cirro-cumulus.
9	29.742	73	66	63	59 5	"	WSW	"	Cumulo strati.
10	29.744	74	69	65	59	NNE	SSW	"	"
11	29.754	74	71	66	62 5	NE	Still.	.....	Cirro-cumulus.
12	29.750	76	73 5	67	64	SE	ESE	none.	Cirrus.
1 P. M.	29.744	76	74	67 5	62	"	W	light.	"
2	29.743	76 5	72	66	62 5	ESE	WNW	"	Cumuli.
3	29.749	75 5	69	64	61	E by S	W	mod.	"
4	29.763	75 5	69	65	62	NE	WbyS	"	"
5	29.756	74	67 5	64	62	E	W	"	"
6	29.768	72 5	66	63	61	NE	SW	"	Cirro-cumuli.
7	29.780	70	64	61 5	60	"	"	"	Cumuli & cum. str.
8	29.806	71	63	61	59	"	SE	"	Cumuli.
9	29.827	72	63	61	59	"	"	"	" rain.
10	29.831	71	62 5	61	58 5	"	"	"	Nimbus; "
11	29.827	72	63	61	58	"	"	"	" "
12	29.831	71	63	61	59	"	"	"	" cum. str.
1 A. M,	29.837	70	62	60 5	59	"	"	"	"
2	29.838	70	62 5	61	59	"	Still.	light.	"
3	29.836	70	62 5	61	59	"	"	"	"
4	29.847	69	61 5	60	59 5	"	"	"	" rain.
5	29.865	68 5	60 5	59 5	57 5	"	"	"	"
6	29.874	68 5	64	61 5	57 5	"	"	"	"
7	29.894	69	61	60	57 5	"	"	"	" rain.
8	29.893	69	63	61	57 5	E	W	"	" "
9	29.881	69	64	61 5	57 5	"	"	"	Cumuli.
10	29.900	69	64	61 5	58	"	WNW	"	Cumulo-strati.
11	29.902	70	69	63 5	58	"	"	"	Cirro-cumuli.
12	29.900	72	71	65	60	ESE	ENE WNW	"	Cumuli.
1 P. M.	29.895	73	71 5	64 5	61	SE by E	WNW	moder.	"
2	29.895	72	72	66	61	"	SE WNW	light.	Cirrus.
3	29.888	72	70	64	59	SE	NW	"	Cumulo-stratus
4	29.880	72	72	65	58	"	"	"	Cirro stratus.
5	29.869	72	71 5	64 5	60	"	NNW	moder.	"
6	29.870	71	69 5	64	59 5	"	"	"	"
Mean.	29.821	71.2	66.4	62.8	59.6				.018 rain.

The barometer was very carefully made by J. Green; filled with mercury of the sp. gr. 13.628; its cistern is of wood, with a glass cover; int. diam. of tube .25, ext. .60. The dew point was found by the condensation of vapor on the surface of a silver cup.

Height of cistern 53 ft. 412 above mid-tide.

TABLE VIII.

METEOROLOGICAL OBSERVATIONS

Made at William's College, for 37 successive hours, commencing 6 A. M. of the 21st of June, 1836, and ending 6 P. M. of the following day.

Lat. 42° 42′ 44″ N.; Long. 73° 15′ 14″ W.

By Prof. A. Hopkins.

Hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Rain in inches.	Dir. wind.	Strength of wind.	REMARKS.
6 A. M.	29.269	.....	50 5	....	NE	strong	Sky thickly clouded.
7	29.266	....	51 5	0.01	"	"	Rain.
8	29.250	.....	52 5	....	"	"	Thickly clouded.
9	29.274	.....	54	....	"	"	"
10	29.341	.....	55 5	....	"	"	"
11	29.256	.....	57 75	....	"	"	"
12	29.240	.....	59	....	"	"	"
1 P. M.	29.251	.....	58	....	"	"	"
2	29.259	.....	56	....	"	"	"
3	29.264	.....	57	....	"	"	"
4	29.233	.....	58	....	"	"	"
5	29.246	.....	57	....	"	"	"
6	29.264	....	54 5	....	"	"	"
7	29.303	.....	51 5	....	"	"	"
8	29.306	.....	51	....	"	"	"
9	29.311	.....	50 5	....	"	"	"
10	29.329	.....	49 75	....	"	"	"
11	29.309	....	49 5	....	"	"	"
12	29.309	56	49 5	....	"	"	"
1 A. M.	29.309	56 5	49 75	....	"	"	"
2	29.299	56 5	49 5	....	"	"	"
3	29.293	58	50	....	"	"	"
4	29.309	56 75	49 75	....	"	gentle.	"
5	29.309	56	50 5	....	"	"	"
6	29.319	56	56 5	....	NbyE	calm.	"
7	29.325	56 75	54 5	....	"	"	"
8	29.336	57	57	....	"	gentle.	"
9	29.343	58	58	....	"	"	"
10	29.350	59	59	....	"	"	"
11	29.335	64	64	....	"	"	"
12	29.307	60	67	....	"	"	"
1 P. M.	29.307	60 5	67	....	EbyS	"	"
2	29.325	61	64	....	"	"	"
3	29.341	60 5	62	...	"	calm.	"
4	29.345	61	63 5	....	"	"	"
5	29.314	60 75	60 75	....	"	"	"
6	29.327	60 5	58 5	....	E	"	"
Mean.	29.299		55.52	0.01			

The instruments were made by Troughton; the barometer has been refilled in this country; it is adjusted to zero by means of an ivory float in the basin.

TABLE IX.

METEOROLOGICAL OBSERVATIONS

Made in the City of New-York, on the 21st and 22d days of June, 1836, at intervals of four hours.

Lat. 40° 42′ 40″ *N.; Long.* 74° 1′ 8″ *W.*

By W. C. Redfield.

Hours of observa.	Barometer.	Thermom.	Winds.	Strength of wind.	Clouds, direction.	REMARKS.
21st						
6 A. M.	29.94	52	NE	fresh.	WSW ENE	Rain.
10	.97	54	NNE	"	"	Cloudy.
2 P. M.	.97	56	"	moder.	"	"
6	30.02	56	NE	"	"	"
10	.05	56	"	"	.....	"
22d						
6 A. M.	.09	52	NNE	"	WbyS NEbE	" and thunder; fair.
10	.10	57	"	"	"	Fair; cloudy.
2 P. M.	.10	62	SSE	"	"	Cloudy.
6	.10	59	"	"	"	"
10	.16	58	"	"	.....	"
Mean.	30.06	56.2				

The barometer is a new one made by Roach, under special directions, with a glass cistern and solid bottom, not liable to vary in its adjustment, (which was attained with great care); the zero being at 30 inches, the different areas of the tube and cistern are as 1 to 40. The cistern is placed within 10 feet of the mean level of the sea. No correction is deemed necessary for temperature or capillarity. The direction of the upper and lower strata of clouds is indicated by placing them thus, WSW upper.
ENE lower.

TABLE X.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Royal Society, Somerset House, for 37 *successive hours, commencing* 6 *A. M. of the* 21*st of Sept.* 1836, *and ending* 6 *P. M. of the following day.* (*Greenwich mean time.*)

Lat. 51° 30′ 49″ *N.; Long.* 0° 5′ 47″ *W.*

By Mr. I. D. Roberton, Assistant Secretary Royal Society.

Hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Rain in inches.	Wind.	REMARKS.
6 A. M.	30.109	52 3	43 6	....	W	Thick broken clouds, with light wind.
7	30.122	52 4	44 5	....	"	" " "
8	30.138	52 7	46 0	....	"	Cloudy; light wind.
9	30.152	53 5	48 4	....	"	" "
10	30.160	54 5	50 7	....	WSW	" "
11	30.160	55 6	51 4	....	"	" "
12	30.170	56 2	51 5	....	WNW	" "
1 P. M.	30.176	57 2	51 6	....	NW	" "
2	30.182	57 3	52 2	....	"	" "
3	30.176	57 1	51 9	....	WSW	Fine; light clouds and wind.
4	30.172	56 6	51 4	....	"	" very light clouds.
5	30.182	56 0	51 3	....	SW	Cloudy; light wind.
6	30.186	55 3	50 6	....	"	" "
7	30.198	54 6	50 7	....	.....	" "
8	30.214	54 1	49 8	....	.....	Thick broken clouds bearing down SSW.
9	30.221	53 7	48 7	....	.....	" " "
10	30.225	53 5	48 3	....	.....	" " "
11	30.231	53 2	46 7	....	.....	" " "
12	30.241	52 6	46 8	....	.....	" " "
1 A. M.	30.249	52 4	46 6	....	.....	Fine & clear; light wind; beautiful star-
2	30.251	52 2	45 2	....	.....	" " " [light.
3	30.253	51 6	43 6	....	.....	" " "
4	30.255	51 3	42 6	....	.....	" " "
5	30.257	50 7	42 3	....	WSW	" "
6	30.269	50 5	42 4	....	"	Light clouds and wind.
7	30.273	50 7	44 3	....	"	Light fog and wind.
8	29.273	51 2	45 3	....	W	" "
9	30.277	51 6	47 4	....	"	" "
10	30.294	52 5	49 8	....	WSW	Cloudy; light wind.
11	30.283	53 7	52 5	....	SSW	" "
12	30.273	55 2	55 2	....	SW	" "
1 P. M.	30.265	55 9	55 4	....	SSW	" "
2	30.245	56 2	55 9	....	SSE	Fine; light clouds and wind.
3	30.235	56 2	56 3	....	SSW	Cloudy; light wind.
4	30.211	56 0	56 0	....	S	" "
5	30.204	56 3	55 3	....	SE	" "
6	30.192	55 6	54 2	....	"	" "
Mean.	30.216	54.0	49.4			

TABLE XI.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Albany Institute, Albany Academy, for 37 *successive hours, commencing* 6 ***A. M.*** *of the* 21***st*** *of* ***Sept,*** 1836, *and ending* 6 ***P. M.*** *of the following day.*

Lat. 42° 39′ 3″ N.; Long. 73° 46′ 38″ W.

By a Committee of the Institute.

Hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Dew point.	Direction of wind.	Force.	Clouds, from.	REMARKS.
6 A. M.	30.163	60	53 75	....	N	brisk.	NW	Cir. cum. cls. scat. ov. hea.
7	30.168	62	55 30	51	NNE	"	"	" break. away.
8	30.149	58	58 00	50	NE	gentle.	W	" overhead.
9	30.158	60	60 10	48	NNE	"	"	Clear overhead; cirri & cir.
10	30.168	64	64 25	50	NE	light.	"	Cloudy. [cum in hori.
11	30.145	67	67 90	50	WNW	"	"	"
12	30.143	72	73 10	50	"	"	"	Overcast.
1 P. M.	30.115	72 9	74 20	50	W	"	"	"
2	30.117	74	75 25	52	"	"	"	"
3	30.105	73	74 50	50	WSW	"	"	"
4	30.112	70 5	71 25	52	S	"	"	"
5	30.105	67	67 50	52	SSW	"	"	"
6	30.102	64	63 75	53	"	"	"	"
7	30.119	61 7	61 75	56	S	"	"	"
8	30.119	61 5	60 75	56	"	"	"	"
9	30.106	61	60 00	56	"	"	"	"
10	30.120	59 5	58 75	56	"	"	"	"
11	30.114	57 5	57 75	58	"	"	"	Light cir. cum. cls.; faint
12	30.090	57 1	56 25	52	"	"	.....	Clear. [aurora.
1 A. M.	30.094	55 5	55 00	52	"	"	.....	"
2	30.089	55	54 10	54	"	"	W	Cloudy; cir. cum. & stra.
3	30.084	54 9	54 00	54	"	"	"	" to S; clear ov.; faint
4	30.084	55	54 00	52 7	"	"	"	" W " [aurora.
5	30.082	55 7	55 00	53 3	"	gentle.	"	Cls. ass. cir. cum. shape.
6	30.088	55 5	54 75	53 5	"	"	.....	Clear; cir. cum. cls. in ho.
7	30.084	59	57 75	54 8	"	light.	N.	Cloudy; cum. & scuds S.
8	30.065	62 5	62 00	54 4	"	brisk.	NW	" "
9	30.066	61 2	64 25	55 3	SSW	light.	"	Clear overh'd; lt. cir. cum.
10	30.025	68	68 25	56 0	"	"	"	" "
11	30.003	70 5	71 00	57 5	"	"	"	" "
12	29.979	76	76 25	57 2	"	brisk.	"	" "
1 P. M.	29.966	77	78 60	55 6	"	"	"	" "
2	29.963	74	73 50	55 7	"	"	"	Overcast.
3	29.969	68 2	69 35	57 0	S var.	"	"	Rain com. 55m. past 2.
4	29.954	70	66 50	57 7	"	"	"	Overcast; scuds from S.
5	29.954	70	65 75	58 5	S	"	"	" "
6	29.936	70	65 00	58 6	"	gentle.	"	" "
Mean.	30.078	64.4	63.75	53.8				Am't of rain .003 of an in.

The barometer used in the above obs. was by Roach of N. Y.; with permanent glass cistern; neutral point 30, temp. 65°, capacity 1-39. The external thermometer is by Troughton and Simms of London. The dew point was taken by Pouillet's hygrometer until 5 A. M. of the 22d, after which it was deduced from the wet bulb thermometer. Position of instruments same as in December. Time ascertained by a transit instrument on the 19th.

TABLE XII.

METEOROLOGICAL OBSERVATIONS

Made at Montreal, Lower Canada, for 37 successive hours, commencing at 6 A. M. of 21st Sept. and ending 6 P. M. of the following day.

Lat.* 45° 30′ *N.; Long.* 73° 22′ *W.

By J. S. McCord, Cor. Sec. Natural History Society, Montreal.

Hours of observa.	Baron. ap par. height	Attached Ther.	External Ther.	Dew point.	Direc. of wind.	Force.	REMARKS.
20th							
9 A. M.	29.842	71	68	....	SW	3	
9 P. M.	30.100	71	59	....	"	2	
21st							
6 A. M.	.200	70	49	....	N	1	Clear; cloudless; beautiful sunrise.
7	.200	69	51	....	"	1	"
8	.210	68	53	42	N | NW	1	" light clouds rising in E.
9	.208	68	56	....	"	0	" " "
10	.200	68	57	42	"	0	Cloudy; mottled cirro stratus.
11	.194	67 5	60	....	N	0	"
12	.170	67	62	46	NNW	1	" clearing in the N & W.
1 P. M.	.134	67	61	....	W | N	1-0	Clear; a few cirro cumuli.
2	.122	67	64	45	"	1	"
3	.102	67	65	....	"	1	"
4	.092	67	64	44 5	"	0	" not a cloud above the hori.
5	.092	66 5	63	....	N	0	"
6	.092	66 5	62	....	"	0	"
7	.080	67	58	....	"	0	"
8	.080	67	57	....	"	0	"
9	.078	67	56	....	"	0	"
10	.082	67	54 5	....	"	0	" bright moonlight.
11	.082	67	54	...	"	0	"
12	.082	67	54	....	"	0	"
22d							
1 A. M.	.066	67	54	....	"	0	"
2	.050	67	54	....	"	0	" brilliant starlight; not a cloud.
3	.050	67	51	....	"	0	" " "
4	.044	67	52	....	"	0	" " "
5	.036	67	52	....	"	0	"
6	.036	67	52 5	....	N | W	1	Cloudy; cumuli.
7	29.016	67	55	....	N | SW	1	"
8	.990	67	58	....	N | W	1	"
9	.990	66	61	....	"	1	" cirri and cumuli.
10	.966	66	63	55	"	1	"
11	.940	66	66	....	"	0	" nearly all over horizon.
12	.936	66	70	58	SW | E	1	" " "
1 P. M.	.918	66 5	69	....	S | SW	1	" " "
2	.894	67	70	58	"	0	" " "
3	.870	67	72	....	"	0	" " "
4	.870	67	72	59	"	0	" " "
5	.870	67	71	...	"	0	" breaking up.
6	.870	67	69	60	"	0	"
Mean.	30.051	67 1	59 8	50 9			Bar. corrected for cist. cap. and reduced to 32° Fah. 30.019.
23d.							
9 A. M.	29.966	66	53	....	N	1	Cloudy.
9 P. M.	.896	67	59	...	"	1	"

Instruments and position same as in December.

N. B. N | W signifies that there was an *upper* current blowing N, whilst *below* the wind was W.

TABLE XIII.

METEOROLOGICAL OBSERVATIONS

Made at the Institute, Flushing, L. I., *for* 37 ***successive hours,*** *commencing at* 6 ***A. M.*** *of the* 21*st of September*, 1836, *and ending* 6 ***P. M.*** *of the following day.*

Lat. 40° 44′ 58″ *N.; Long.* 73° 44′ 20″ *W.*

By Prof. C. Gill.

Hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Wet bulb Ther.	Winds, from.	Clouds, to.	Strength of wind.	REMARKS.
6 A. M.	30.194	67	62 50	58	NE	SE	light.	Bright clouds, mostly spread.
7	.209	67 50	63	58	"	"	"	Clouds a little darker.
8	.164	67	64 50	58 50	"	"	gentle.	" "
9	.165	67 50	67 50	59	"	"	"	" lighter & more broken.
10	.181	69	70	61	"	"	fresh.	Sun appears at intervals.
11	.182	69 50	70	61	"	"	"	Clouds darkening.
12	.183	70	71 25	62 50	"	"	"	" "
1 P. M.	.168	69	68 50	60 50	"	"	gentle.	" "
2	.156	68 50	68	61	"	"	"	A few drops of rain.
3	.135	68	67 50	61	"	"	"	Clouds overspread.
4	.135	67 50	67 25	60 50	"	"	very lt	" "
5	.136	67	66	60 50	"	"	"	" "
6	.128	65 50	64 50	60 50	"	"	"	Dark cls. & rain; rained from
7	.151	65	63	60	....	....	calm.	" " [6 to 8 .12 in.
8	.156	67	61 50	60	....	....	"	Clouds overspread.
9	.162	67	61	59 50	S	N	light	" "
10	.175	66	61	59 50	"	NW	very lt	" "
11	.143	66	60 50	59	"	"	"	" "
12	.143	66	61	59 50	"	"	"	" "
1 A. M.	.138	66	61 25	60	"	"	"	" "
2	.144	66	61 50	60	"	"	"	" "
3	.139	66	62	60	"	"	"	" "
4	.126	65	61 50	60	"	"	"	" "
5	.108	65	61 50	59 75	"	"	"	" "
6	.120	65	62	60	"	N	"	Clouds prrtially breaking.
7	.120	65	66 50	63	"	"	"	" "
8	.111	69	70	65	"	"	"	" "
9	.119	69	71	66	"	"	"	" "
10	.121	69	70	65	"	SE	light.	Clouds darkened suddenly
11	.110	69	71 25	65 25	"	E	"	Overcast. [about 9 3–4.
12	.091	69	73 50	66 50	"	SE	"	Dark clouds.
1 P. M.	.068	68	70 25	66 25	"	NE	gentle.	Rain; from 12 1–4 to 4½ P.
2	.033	68	69	65	"	"	"	" [M. .20 in.
3	.005	68	70	67	SE	NW	very lt	"
4	29.993	68	68	66	"	NE	gentle.	"
5	.994	67	67	65 50	"	"	very lt	Misty.
6	.987	67	67	65 50	....	....	calm.	"

The barometer was made with extreme care, for the purpose, by Pike of N. Y. having a glass cistern, with an adjustment for the neutral point, and can be read off to the .001 of an inch. Correction for capillarity .025. In 34 observations made on this instrument and the one used in June, there is a mean difference of .02.

Height of barometer above low water mark of Flushing bay, 54 ft.

TABLE XIV.

METEOROLOGICAL OBSERVATIONS

Made at the Wesleyan University, Middletown, (Ct.) for 37 *successive hours, commencing at* 6 *A. M. on the* 21*st of Sept.* 1836, *and ending at* 6 *P. M. of the following day.*

Lat. 41° 34′ 43″ *N.; Long.* 72′ 39′ *W.*

By Prof. A. W. Smith.

Hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Dew point.	Winds, direction.	Strength.	Clouds, kind.	Direction.	Weather.	Rain in inches.
6 A. M.	29.807	71 5	56	52	N	gentle.	cirrus.	W	fair.	
7	29.822	71 5	58	52	"	"	"	"	"	
8	29.824	74	62 5	52	NE	fresh.	"	NW	"	
9	29.844	74	68	52	NNE	"	"	"	"	
10	29.851	75	69 5	51	N	gentle.	ci. stra.	"	"	
11	29.844	75	71	49	NNE	light.	"	"	"	
12	29.841	75	70	52	NE	"	"	"	cloudy	
1 P. M.	29.836	75	72	53	ENE	"	stratus.	"	"	
2	29.821	75	69	58	SE	"	"	SW	"	
3	29.818	75	69	56	W	"	"	W	"	
4	29.818	75	67	56	"	"	"	"	"	
5	29.818	74	64 5	56	"	"	"	"	"	
6	29.816	73 5	62	57	SE	very li	"	"	"	
7	29.836	74	61 5	57	"	"	"	"	"	
8	29.824	74	60	58	S	light.	"	"	"	
*9	29.827	73	59	57	SE	"	"	"	"	
10	29.829	72 5	59	56	"	"	"	"	"	
11	29.829	72 5	58	56	"	"	"	"	"	
12	29.830	72	58	56	S	"	ci. strat.	"	"	
1 A. M.	29.829	71 5	57	54	SE	"	cirrus.	WNW	fair.	
†2	29.832	71 5	56 5	54	"	"	"	"	"	
3	29.833	71	56	55	"	"	stratus.	"	cloudy	
4	29.833	71	56 5	55	"	"	"	"	"	
5	29.822	70 5	56	55	S	"	"	"	fair.	
6	29.813	70	55	54	"	very li	"	W	"	
7	29.808	71	58	53	"	"	cirrus.	"	"	
8	29.802	73	65 5	60	E	"	"	"	"	
9	29.803	75	68	62	SSE	"	"	"	"	
10	29.793	76	70	63	"	gentle.	"	"	"	
11	29.770	75 5	71 5	62	S	fresh.	"	"	"	
12	29.746	75	70	62	SW	brisk.	ci. strat.	"	cloudy	
1 P. M.	29.743	75	70	62	S	gentle.	"	"	"	
2	29.723	74 5	67 5	61	W	brisk.	nimbus.	"	"	
3	29.706	73 5	63	63	"	gentle.	"	"	rain.	.05
4	29.694	74	62	62	SE	"	"	"	"	.05
5	29.694	73 5	62	62	"	"	"	"	"	.02
6	29.676	73 5	62	62	"	"	"	"	"	.01
Mean.	29.8015	73 51	60 55	56 95						0.13

Instruments and position same as in June.

* Lunar halo. † Aurora borealis faintly visible.

TABLE XV.

METEOROLOGICAL OBSERVATIONS

Made at Gardiner, Maine, for 37 successive hours, commencing at 6 A. M. of the 21st of Sept. 1836, and ending 6 P. M. of the following day. Autumnal Equinox.

Lat. 44° 10′ *N.*

By W. H. Gardiner, Esq.

Hours of observa.	Barometer.	Attached Ther.	External Ther.	Wet. bulb Ther.	Wind.	Clouds.	REMARKS.
6 A. M.	30.18	70	54	53	NW	cir. st.	Fresh breeze; clear, except at S.
7	30.20	69 50	59	57	"	clear.	" not a cloud.
8	30.21	70	58	56	N	cir. st.	" haze at the S.
9	30.22	68	60	56 50	NNE	"	" clear.
10	30.22	70	65	59 50	"	"	Moderate.
11	30.23	71	67	62 50	NE	"	"
12	30.23	72	68	62	"	"	Very moderate.
1 P. M.	30.21	72	66 50	61 50	"	"	"
2	30.20	70	70	65	calm.	"	Calm.
3	30.20	72	69	61	NNW	"	Very light breeze.
4	30.19	72	68	61	W	"	" "
5	30.19	72	64	60	SW	"	" "
6	30.19	71	61	58	"	"	Nearly calm.
7	30.19	70	56	54	calm.	"	Calm.
8	30.19	70	55	53	"	"	Clouds very faint.
9	30.19	70	53	51	"	"	" moon bright.
10	30.20	69	52	50	"	"	Slight air from SW "
11	30.20	67	51	50	"	clear.	Slight haze SW; halo ro. moon.
12	30.20	66	51	50	"	"	Very sli. air SW; sli. haze SW.
1 A. M.	30.20	65	49	48	"	"	Slight haze over river.
2	30.20	65	49	47	"	stratus	" fog from the river.
3	30.19	64	49	49	"	"	Very slight fog.
4	30.19	63	50	49	"	"	"
5	30.18	62	51	50	"	"	"
6	30.18	62	53	51	"	"	"
7	30.18	62	54	53	SE	"	Fog from the river.
8	30.18	63	57	56	"	"	Fog dispersing into nimbus clo's.
9	30.17	64	59	58	"	nimb.	and cir. stratus; clear overhead.
10	30.14	61	65	62	"	cir. st.	Fresh breeze; cloudy.
11	30.11	67	67	65	"	"	" "
12	30.10	68	69	65	SW	"	" " halo ro. sun.
1 P. M.	30.07	69	71	67	"	"	" " "
2	30.05	70	69	65	"	"	" "
3	30.06	70	67	65	S	"	" "
4	30.04	71	66	63	"	"	" "
5	30.04	70	64	62	SSW	"	" "
6	30.03	71	62	59	SW	"	" "
Mean.	30.17	68.1	59.9	57.1			

These observations were made with a barometer made by Dolland, London. Height of barometer above low water mark in Kennebec river, 40 feet. The external thermometer was a spirit thermometer, made by Bate, London. The wet bulb thermometer was a mercurial thermometer, made by Thos. Rubergall, Lon.

TABLE XVI.

METEOROLOGICAL OBSERVATIONS

Made at William's College, for 37 successive hours, commencing 6 A. M. of the 21st of Sept. 1836, and ending 6 P. M. of the following day.

Lat. 42° 42′ 44″ *N.; Long.* 73° 13′ 30″ *W.*

By Prof. A. Hopkins.

Hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Wind.	REMARKS.
6 A. M.	29.360	70	51	NW	Clouds cirro cumulus; nearly calm.
7	29.363	69	55	"	
8	29.361	71	61 5	"	
9	29.365	71 50	62	"	Nearly clear.
10	29.356	74	62 5	.....	
11	29.353	75 50	68 5	.....	Cirro stratus.
12	29.353	75	71	S slight.	
1 P. M.	29.336	74 50	71	"	
2	29.330	76	71	"	
3	29.325	72	70	.....	
4	29.244	71 50	68	.....	
5	29.330	70	65 5	.....	Thick cloudy.
6	29.330	70	63	S calm.	
7	29.330	69 50	59 5	.....	
8	29.333	68 50	57 75	.....	
9	29.342	66	56	.....	
10	29.342	66 50	54	.....	Lighting up.
11	29.362	60	54	.....	Thick haze.
12	29.348	64	52	.....	Clouds cirro cumulus.
1 A. M.	29.348	64 50	49	SW	Thick clouds SW; white fleecy S.
2	29.351	63	48	Still.	Dark clouds skirting S horizon.
3	29.357	61	47 3	S	Misty.
4	29.354	61 25	48	SSE	Fog.
5	29.336	61 50	48	Calm.	
6	29.323	59 50	46 5	.....	Cirro cumulus scattered.
7	29.319	59 50	51 5	.....	
8 30	29.300	62	59	.....	
9	29.298	64	64	SE	
10	29.260	70	65	.....	
11	29.251	70 50	70	.....	
12	29.229	72	73	.....	
1 P. M.	29.207	74 50	76	.....	
2	29.184	73	75	.....	
3	29.136	71	71	SE str'g.	Thick cloudy.
4	29.163	70 50	67 5	.....	Slight rain.
5	29.183	68 25	66	.....	
6	29.183	68 25	65 5	.....	Dark; cloudy.
Mean.	29.305	68.3	61		

Instruments and position same as in June. These observations give the height of the convex surface of the mercurial column above the mercury in the cistern.

TABLE XVII.

METEOROLOGICAL OBSERVATIONS

Made in the city of New-York, from Sept. 20th to 23d, inclusive.

By W. C. Redfield, Esq.

Hours of observa.	Barometer.	Thermom.	Attached Ther.	Winds.	Strength.	Clouds, from.	REMARKS.
20th.							
6 A. M.	30.09	71	76	WSW	light.	.....	Clear.
10	.12	77	77	NW	moderate.	.....	"
2 P. M.	.08	83	78	"	"	SW SW W	Fair; small ranges of light cloud from SW at 4 P. M; a lower stratum of cloud and haze [from W
6	.10	80	78	" N	"	SW W	Cloudy from W. moon appears, and fair.
10	.18	76	78	N	"	W	Fair.
21st.							
6 A. M.	.28	65	74	N by E NNE	"	"	Cloudy; clouds moving from W; fair at N and NE.
8	.30	65	73	NE NE by E	" fresh	W½S	" and broken.
10	.34	66	74	" "	fresh.	W by S	" "
12	.30	68	74	NE by E	moderate.	"	"
2 P. M.	.30	69	74	"	"	"	"
4	.30	68	73	"	"	"	" rainy at 4.40.
6	.28	67	73	"	"	"	Rainy.
8	.30	65	72	"	"	"	" cloudy; moon visible.
10	.30	64	73	"	light.	"	Cloudy.
12	.30	64	72	"	"	"	"
22d.							
2 A. M.	.28	64	72	"	"	.....	"
4	.27	64	72	"	"	W	"

6	.25	64	72	NE by E	light.	W	Cloudy.
8	.28	66	71	SW	"	W S	Clouds thin and broken.
10	.26	69	72	SSW	"	"	Cloudy.
12	.23	69	71	S	"	"	" rain at 12.20.
2 P. M.	.19	68	72	SSE	"	"	Cloudy and rainy.
4	.13	68	71	"	"	"	" " cloudy.
6	.12	68	72	"	"	"	" "
8	.14	68	72	"	"	"W br	" " clouds thin and brisk from W; moon visible.
10	.13	67	72	SW	"	W brisk.	
23d.						.....	
6 A. M.	.06	67	71	" WSW	" mod		Cloudy and foggy.
10	.05	72	74	WSW	moderate.	W W by S	Fair.
2 P. M.	29.98	78	77	NW N NE	" fresh	W WSW br NE brisk	Fair; cloudy at 5.15; at 5.25 hard rain, wind fresh from NE, with a low rain scud from [same quarter.
6	30.00	70	75	NE	moderate.	" "	Fair; cloudy and rain; fair. "
10	.08	68	75	"	"	W NE	Cloudy and rainy.
Mean.	30.19	68.9	73.5				

The fractions of degrees of the thermometer are avoided by approximation. The cistern of the barometer is about ten feet above the presumed level of the sea, and the instrument is graduated from a zero at 30 inches at temperature of 62° Fahrenheit. Area of the cistern to that of the tube as 40 to 1. No corrections are made in the entries, and none is deemed necessary on account of capillarity, it having been provided for in the adjustment, which is deemed to be accurate within the one hundredth of an inch.

TABLE XVIII.

METEOROLOGICAL OBSERVATIONS

Made at New-Haven, Ct., at intervals of ½ an hour, for 49 successive hours, commencing at 6 P. M. of the 20th of Sept., 1836, and ending at 6 P. M. of the 22d.

***Lat.* 41° 17′ 58″ *N.; Long.* 72° 57′ 46″ *W from Greenwich: according to American Almanac*, 1836.**

By E. C. Herrick and J. D. Whelpley.

Hours of observa.	Barometer.	Attached Ther.	External Ther.	Wind.	REMARKS.
20th,					
6 P. M.	30.05	78	78	WNW calm.	Nearly covered with cum. & fleecy cls.
6 30	30.06	77 50	77 50	"	Cloudy in NE region; else nearly clear.
7	30.07	77 33	77 33	calm.	Nearly clear in S; elsew. fleecy clouds.
7 30	30.09	76 50	76 50	"	" " "
8	30.10	76 50	76 50	"	Nearly clear.
8 30	30.11	75 75	75 50	"	Nearly covered with fleecy clouds.
9	30.12	75 50	75	"	Chiefly cloudy.
9 30	30.13	75 50	75	N fr. breeze.	"
10	30.13	74 75	72	light breeze.	Ent. overcast; cls. in N cum. & ragged.
10 30	30.15	74 50	71	fresh breeze.	" cls. in zenith broken.
11	30.16	73 50	70	"	"
11 30	30.16	72 50	69	very "	"
12	30.16	72	68	fresh breeze.	"
21st,					
12 30	30.17	72	67	"	"
1 A. M.	30.17	72	66 25	"	"
1 30	30.17	71 80	66	light breeze.	Clouds mostly off; hazy.
2	30.17	71 50	65	"	Hazy; few clouds.
2 30	30.17	71 33	64	"	"
3	30.17	71	62	calm.	"
3 30	30.17	71	62	nearly calm.	Overcast.
4	.....	.....	.....	.....	No observation.
4 30	30.19	70 50	62	calm.	Overcast.
5	30.20	70	61	"	Clouds broken.
5 30	30.23	70	61	N sli. breeze.	Chiefly cloudy; hazy.
6	30.24	69	59 33	NNE "	Chiefly clear.
6 30	30.24	67 75	59	NNE calm.	Hazy. [moving to ESE.
7	30.26	66 50	60	N "	Chiefly clear; hazy in SE; upper cls.
7 30	30.26	66	61	NNE li. br.	Clear; a few cirrus clouds in the zenith.
8	30.28	66 50	63	.....	" "
8 30	30.28	66 75	64	NNE li. br.	Clear.
9	30.28	67 50	65 50	NE "	Clear; a few scattered clouds in the N.
9 30	30.28	67 50	68	NNE "	Mostly clear; lofty cir.&vel. cls. in N.
10	30.28	67 50	71 50	ENE var.	" " "
10 30	30.28	68	72	"	" clouds collecting in N.
11	30.28	68	74	NE nea.calm	Chiefly overcast; cls. somewhat broken.
11 30	30.28	68 50	72	SSE li. br.	Ent. overcast; clouds overhead slowly
12	30.28	68 50	70	"	" [drifting due E.
12 30	30.27	68 50	69	SE calm.	" cls. sluggish; sun shine 1h15m.
1 P. M	30.27	68 50	69	"	" " "
1 30	30.25	69	69 50	SE li. breeze	" clouds high and white.
2	30.25	69	69	SSE "	Overcast; occasional breaks.
2 30	30.26	69	69	SbyE"	Ent. overcast.
3	30.25	68 67	68	SE calm.	" a few drops of rain falling.
3 30	30.25	68 50	67	SSE&S "	" cls. flying from W to E.
4	30.25	68	67	S by E "	" " "
4 30	30.25	68	66	SSE gen. br.	" 1 consolidated homogeneous cl.

TABLE XVIII, (CONTINUED.)

Hours of observa.	Barometer.	Attached Ther.	External Ther.	Wind.	REMARKS.
5	30.25	68	66	S calm.	Ent. over.; 1 cons. homogeneous cloud.
5 30	30.25	68	65	SSE calm.	" rain, began mod. 5h. 10m.
6	30.26	67 66	65	"	" rain ceased; app. of break. up.
6 30	30.25	67 66	64	calm.	" "
7	30.25	67 66	63 80	"	" " damp.
7 30	30.25	67 66	63	"	"
8	30.26	67 66	63	"	Nearly over.; but breaking away in S.
8 30	30.26	67 50	62 66	"	Entirely overcast.
9	30.26	67 50	62	"	" clouds in S thin.
9 30	30.26	67 33	62	"	"
10	30.26	67	61 50	"	"
10 30	30.26	66 75	61	"	"
11	30.26	67	61	"	"
11 30	30.26	67 50	61	"	"
12	30.25	67 50	60 80	"	"
22d, 12 30	30.26	67 50	60 80	"	"
1 A. M.	30.25	67 50	60	"	Clearing off. [over. with heavy cls.
1 30	30.25	67 50	59	"	Nearly clear; very bright in NE; W sky
2	30.25	67 50	59	"	Clear in SE and zenith; heavy broken
2 30	30.25	67 25	59	"	Darkly overcast. [cls. in W, N & SW
3	30.26	67 25	59	"	"
3 30	30.26	67 10	59	"	Very clear.
4	30.26	67 10	58	"	Cloudy.
4 30	30.26	67 10	58	"	"
5	30.25	67	58	"	Clear in the zenith; clouds light.
5 30	30.25	67	57	"	" " [& scat'd.
6	30.25	67	54 40	"	Vanes in con. dir.; par. ove'st; cls. high
6 30	30.25	65	58	"	" mostly " cls. brok.
7	30.24	64 20	59	"	" nearly clear.
7 30	30.24	64 50	60	"	" "
8	30.24	65	63	"	" mostly overcast.
8 30	30.24	66	64	S calm.	Mostly overcast.
9	30.24	66	64 50	"	" cls. in zenith drif. SSE or SE.
9 30	30.24	66 50	67	SSE lt. br.	" clear; cls. high & vellose. "
10	30.23	67	69	"	" "
10 30	30.23	67 50	68	"	" overcast.
11	30.22	67 50	68	S li. breeze.	"
11 30	30.21	67 50	67	SSE calm.	Entirely " began to rain 11h. 40m.
12	30.20	67 50	67	S "	" " gentle rain.
12 30	30.19	67 50	67	SSW "	" " "
1 P. M.	30.18	67 50	66 50	SW by S "	" " "
1 30	30.17	67 50	65 80	SW "	" " "
2	30.17	67 50	66	" "	" " "
2 30	30.15	67 50	65	" "	" " "
3	30.14	67	65	S "	" " "
3 30	30.13	67	65	S by W "	" " "
4	30.13	67 50	65	S "	" " "
4 30	30.13	67 50	64	" "	" " "
5	30.12	67	64	SSW "	" " rain slackens.
5 30	30.12	67 50	63 50	" "	" " slight rain.
6	30.12	67 50	63	" "	" " "
Mean.	30.21	68.83	65.28		

The barometer was made by Roach of New-York; its cistern is about 40 feet above high water in New-Haven harbor. The north star being obscured by clouds, no observations on the declination of the needle were made until 26th Sept. 0h. 46m. A. M., when by a theodolite the northern end of the needle was found to point 5° 55 W of the meridian—therm. at the time 46°. By observations made by Mr. E. Loomis, and published in the Amer. Jour. of Science, vol. 30, the mean western declination at New-Haven for the year ending Nov. 1835, was 5° 40 34 W.

TABLE XIX.

METEOROLOGICAL OBSERVATIONS

Made at Cincinnati, for 37 *successive hours, commencing at* 6 *A. M. of the* 21*st Sept.* 1836, *and ending* 6 *P. M. of the following day.*

Lat.* 39° 6′ *N.; Long.* 84° 27′ *W.

By JOHN LOCKE, M. D. Professor Medical College, Ohio.

Hours of observa.	Barometer corrected.	Attached Ther.	External Ther.	Wet bulb Ther.	Dew point.	Wind.	Strength of wind.	Clouds, from.	Ang. velo. clouds.	Hygrom.	REMARKS.
6 A. M.	29.347	73	71 5	69	67	SW	.0005	.....	....	98.5	Cloudy? foggy, objects invisible at 1,000 feet.
7	29.349	72	71 5	69	68	"	.0005	.....	....	100.	" " "
8	29.348	72 5	72	69	68	"	.005	.....	....	97.5	Foggy; objetcs visible a mile.
9	29.367	73	73	70	....	S	.010	.....	....	93.0	Cloudy; fog among the trees on the hills.
10	29.363	74 5	75	72	70	"	.020	S	5°	93.5	Overcast.
11	29.350	75 5	76	71	....	SSE	.025	SW	....	93.5	"
12	29.347	77	76	72	71	"	.....	"	1	95.0	Clouds breaking in S.
1 P. M.	29.347	77	76	72	....	SE	.....	"	....	93.75	Cloudy.
2	29.309	80	77	73	73	E	.005	W	1	92.5	Clear; shower at 1h. 15m.; clouds cum. and cirr.
3	29.312	79	78	74	....	"	.015	"	....	90.75	Overcast with cirri; cumuli in horizon.
4	29.284	78	77	74	70	"	.010	"	....	94.5	Slight shower; cloudy.
5	29.287	77	75	74	....	"	.010	"	2	100.	Shower.
6	29.287	77	75	74	71	"	.008	WSW	2	99.	Cloudy, but broken in S.
7	29.277	77	74 5	74	72	"	.016	"	....	100.	"
8	29.269	76	74 5	74	72	SE	.020	"	....	100.	"
9	29.270	75 5	74	73	72	SSE	.020	SW	3 5	96.5	"
10	29.272	75	74	73	72	S	.045	"	1	96.5	Thinly cloudy.
11	29.272	75	74	72	72	SW	.050	"	....	96.5	Clear; a shower since 10; cirri.
12	29.282	75	74	73	72	"	.005	"	....	98.	" overcast with cirri; halo round moon.

1	A. M	29.282	75	73	72	....	SW	.010	SW	....	100.	Overcast; moon seen dimly.
2		29.279	76	74	73	72	W	.010	"	....	98.5	Cirri.
3		29.282	75	73	72	....	SSE	.002	"	....	99.25	Clear, with a few strat. clouds.
4		29.286	75	73	72	72	"	.001	"	....	98.	"
5		29.289	75	73	72	....	.....	.001	"	....	97.5	" a few cirri.
6		29.290	73	71	70	71	E	.003	W	....	98.	" "
7		29.291	72	72	72	....	"	.005	"	0 67	95.	" "
8		29.289	76	76	73	72	W	.030	"	1	90.	" cirri.
9		29.288	76	77	74	....	"	.070	"	0 5	90.	" " abundant.
10		29.287	77	78	75	72	SW	.100	SW	1 5	90.	" ragged cumuli flying low and rapid.
11		29.284	76	78	75	....	"	.170	"	1 5	86.	Flying nimbus like clouds with cirri scarcely moving seen between them.
12		29.284	76	79	75	73	W	.350	W	....	77.75	Cumulus clouds in horizon.
1	P. M.	29.280	79	81	76	72	"	.460	"	7	80.	Clear; flying cumuli nimbus.
2		29.269	79	81	76	74	"	1.300	"	....	88.8	Clear; shower passed 1h. 28m.
3		29.257	81	81	76	....	SW	1.300	SW	....	80.1	"
4		29.256	82	81	76	73	"	1.200	"	....	80.2	Flying cumuli, sky between clear.
5		29.258	84	81	75	....	"	0.200	"	....	80.2	Clear.
6		29.262	83	81	74	73	"	0.100	"	....	87.2	" and settled; western horizon golden.
Mean.		29.279	76.9	75.3	73.0	71.4		.133			93.12	

Barometer made by Roach of New-York, corrected for temperature. Strength of wind ascertained by my zephyrometer and noted according to Lind's scale. Hygrometer made by myself on the plan of Saussure, and the extreme points ascertained by means of fused chloride of calcium, and a moistened vessel, the distance between them divided into 100 degrees.

TABLE XX.

METEOROLOGICAL OBSERVATIONS

Made at Burlington, Vermont, on the 20th, 21st and 22d days of September, 1836.

By Mr. Benedict.

Hours of observa.	Barometer, millim.	Attached Ther.	External Ther.	Dew point.
20th				
11 A. M.	753.7	25.	24.44	58
12	753.7	24.75	25.	58
1 P. M.	753.55	25.55	24.6	56
2	753.7	24.00	24.1	
3	753.95	23.2	23.38	
4	754.	22.2	22.22	
5	754.4	22.2	22.45	
6	754.6	21.5	22.22	
21st				
6 A. M.	757.3	20.5	15.5	51
7	758.3	18.75	16.5	49
8	758.5	18.	17.	47
9	758.65	18.5	14.0	46
10	758.65	18.25	14.7	47
11	758.55	18.6	20.	49
12	758.5	18.6	18.6	48
1 P. M.	758.4	18.5	17.	50
2	758.35	19.	16.7	46
3	758.2	19.	18.5	50
4	758.1	19.	16.6	49
5	758.1	18.75	16.25	50
6	758.	19.	14.5	49
22d				
7 A. M.	757.2	18.	12.75	51
9	756.6	17.75	16.4	54
12	754.9	19.75	21.7	57
3 P. M.	753.5	19.75	21.	60
6	753.3	19.75	19.75	60
Mean.	756.25	20.31	19.09	51.7

These observations were made with a very superior barometer, whose indications require a deduction of .49-100ths of a millimetre to reduce them to those of the Royal Observatory at Paris. The attached and external thermometer are graduated to centigrade degrees. The dew point ascertained by Daniell's hygrometer, graduated according to Fahrenheit.

Cistern of barometer 285 feet above the level of Lake Champlain, which varies at different times of the year from 6 to 8 or even 10 feet.

Mean of barometer reduced to inches, and corrected for temperature, 29.681. Mean of attached thermometer, in degrees of Fahrenheit, 68°56; of external thermometer, 66°37.

TABLE XXI.

METEOROLOGICAL OBSERVATIONS

For the Summer Solstice, made at Feldhausen, near Wynberg, Cape of Good-Hope, on the 21st and 22d of December, 1835.

By Sir JOHN F. W. HERSCHEL.

Day and hour astronomically reckoned. (M. T.) 1835.	Barometer as read off.	Temp. of mercury in barom.	External Thermom.		Actinometer.		Wind.		Esti. quantity of blue sky.
			Dry.	Wet.	Effect of solar radiation.	Time of observa. (M. T.)	Direct'n.	Force.	
20th.					11.12	17 32			
18 0	29.834	67.9	63.0	58.0	.....	.....	.....	0	3
					18.70	18 11	.....	0	
19 0	29.840	67.4	66.5	60.8	.....	.....	.....	0	2
					24.32	19 17	.....	0	
20 0	29.839	67.5	68.1	61.0	.....	.....	SE	1	3
					27.30	20 13			
21 0	29.836	67.9	70.4	62.1	.....	....	.....	0	7
					36.58	21 12			
22 0	29.836	68.0	72.2	62.4	.....	.....	SE	1	9
					37.98	22 16	"		
23	29.836	68.0	73.5	64.0	.....	.....		1	9+
					35.75	23 17	SSE	3	6
21st.									
0 0	29.824	68.0	73.9	64.4	.....	.....	"	2	8
					38.17	0 13	"	3	9
					41.48	0 21	"	3	9
					39.75	0 37	"	4	9
1 0	29.825	68.5	74.7	66.0	.....	.....	"	4	9
					39.42	1 25	"	4	7
2 0	29.824	68.5	74.5	64.0	.....	....	"	5	1
					4.15	2 17	"	5	6
3 0	29.829	68.5	73.5	65.0	... .	.....	"	5	5
					32.05	3 10	"	5	7
4 0	29.822	68.5	71.4	64.5	.....	.....	"	5	8
					4.10	4 11	.....	....	8
5 0	29.828	68.3	69.3	62.8	.....	.....	SSE		
6 0	29.854	68.5	67.2	64.8	.....	.....	"	....	1
7 0	29.876	68.3	65.4	61.0	.....	.....	"		
8 0	29.872	68.2	64.8	60.3	.....	.....	"	....	0
9 0	29.870	68.2	65.0	60.2	.....	.....	"	3	2
10 0	29.875	68.5	64.0	60.0	.....	.....	"	3	10
11 0	29.876	68.5	63.2	59.0	.....	.....	"	3	10
12 0	29.883	68.5	62.0	58.0	.....	.....	"	1	10
13 0	29.856	68.5	62.7	58.4	.....	.... ..	"	1	10
14 0	29.844	68.3	61.3	57.5	....	.....	"	2	10
15 0	29.832	68.1	61.2	57.3	.... .	.....	"	2	10
16 0	29.833	68.0	60.7	57.3	.....	....	"	2	10
					1.55	17 0			
					3.00	17 7			
17 10	29.836	68.0	60.7	57.0	.....	.....	"	2	10
					8.75	17 31			
					10.98	17 41			
18 0	29.845	68.0	63.5	59.0	.....	.....	"	1	10

TABLE XXI, (Continued.)

Day and hour astronomically reckoned. (M. T.) 1835.	Barometer as read off.	Temp. of mercury in barom.	External Thermom.		Actinometer.		Wind.		Esti. quantity of blue sky.
			Dry.	Wet.	Effect of solar radiation.	Time of observn. (M. T.)	Direct'n.	Force.	
					21.50	18 37			
					24.25	18 51			
19 0	29.860	68.0	65.2	59.7	.....	.....	Var.	1	10
					18.25	19 53			
					6.95	19 59			
20 2	29.860	68.1	66.8	60.3	.....	....	N	2	7
					28.40	20 23			
21 0	29.854	68.2	68.7	61.0	.....	.....	.....	0	8
					29.10	21 10	N	2	9
22 0	29.845	68.3	70.7	60.2	.....	.....	.....	0	9
					31.17	22 30	SE	1	9
					31.05	22 51			
					33.08	22 55			
23 0	29.844	68.3	73.3	61.8	.....	....	Var.	2	2
22d.									
0 0	29.830	68.4	74.0	63.2	.....	.....	SSE	2	5
					34.89	0 21	SE	5	6
1 0	29.818	68.6	74.1	63.0	.....	.....	"	5	5
					35.43	1 50	"	6	7
2 0	29.804	68.8	75.0	62.3	.....	.....	"	6	9
3 0	29.790	68.8	75.0	63.1	.....	.....	"	5	8
					21.25	3 24	"	5	6
4 10	29.781	68.8	72.1	62.4	0.00	.....	"	3	4
5 0	29.790	69.0	73.8	64.3	0.00	.....	.....	5	6
6 0	29.802	69.0	67.5	60.5	.....	.....	.....	4	3
7 5	29.830	69.0	65.8	60.0	.....	.....	.....	1	2
8 0	29.832	69.0	64.5	59.0	.....	.....	.....	1	8
9 0	29.836	69.0	62.8	58.5	.....	.....	.....	1	10

Height of the station at Feldhausen above level of the floor of the Circle Room at the Royal Observatory C. G. H. 114 feet. Height of the Observatory above the mean sea level, approximately taken, presumed about 30 feet. The barometer used is uncorrected. It requires a correction of +0.077 in. to reduce its readings to those of the standard barometer used for the circle observations at the Observatory, and a correction of +0.071 in. to reduce to the standard of the Royal Society, by Daniell. The dry external thermometer-readings all require to be corrected by —1.5°; those of the wet by —0.40. The direction of the wind can scarcely ever be correctly judged of at this station, owing to trees and other local causes of disturbance.

REMARKS ACCOMPANYING TABLE XXI.

h. m.
17 32 Fine clear sky to S and SW, but dull and streaky northwards.
18 0 Cirrous streaks, and a thin veil of cirri, slowly rising and increasing from NW.
18 11 The cirri have attained the region of the sun, and begin to affect the actinometer.
19 0 Cirri, as before.
19 17 Cirri, in visible streaks and patches, over the region of the sun, sensibly affecting the actinometer, and rendering its indications irregular.
20 0 Tolerably clear in SW. Much cirrus elsewhere. Zenith covered.
20 13 Much irregular cirrus on sun. Actinometer fluctuated in consequence from 21.10 to 32.70, as the streaks slowly drifted across it.
21 0 Cirri diminishing. They now chiefly lie S and SE. Zenith clear.
21 12 Much white glare about, and some cirrus on, the sun. Much more in its neighborhood.
22 0 Cirri nearly all dissolved. A few linger in the E.
22 16 No cirrus on the sun, but a strong whitish glare all about it.
23 0 A small patch of lingering cirrus behind the Table mountain, (above it in level.)
23 17 Cirri thickening up from NW aloft, and breeze freshening below from SE. Much white glare about the sun, and when examined through a pale brown glass, the edge of a cirrous cloud is seen to be very near the disc.

Dec. 21.

0 0 Cirri again swept slowly away to the ESE. A few fresh ones keep coming up from behind the Table mountain, at a much higher level than its summit.
0 13 The sky rapidly purifying from remains of cirri, in region of the sun.
0 21 Cirri low down in horizon. Sky elsewhere pure. The neighborhood of the sun less affected with white glare than at any hour previous. The sun is now hot, and the blaze of daylight is too strong for the eyes.
0 37 No cirrus on the sun, but a great glare, and whitish patches, indicating impurity, in all the region around it.
1 0 But little cirrus visible, and that chiefly to SW.
1 25 Cirri drifting rapidly aloft, from NW to SE, and passing near, perhaps grazing the sun. A great quantity of diffused glare round sun. As the wind aloft increases, the cirri begin to assume a foamy appearance, mixed with occasional crescent-like forms, concave to the wind. Meanwhile the lower current along the ground is steadily SSE.
2 0 Rapidly clouding with cirro stratus from NW. The cloud-level descends, and the tops of the Table and Devil mountains are dimmed with vapor.
2 17 Actinometer observed in feeble gleams of sunshine struggling through the advancing and thickening clouds.
3 0 Much clearer. A high mackarel cloud, with an evident upper current from W.
3 10 Sun just free from the edge of a high mackarel cloud, drifting from W. Sky clearing generally and rapidly.
4 0 A great mass of cloud now piled on the Table M. The SE current strong below, the westerly one aloft evidently subdued, and veering by the impulse of the lower one round to the south, from which quarter the clouds now drift *along* not *over* the mountain.
4 11 Actinometer observed in few and feeble gleams of sun through the edge of the great cloud-bank on the mountain.
5 0 The upper and lower currents evidently drawing together, the upper coming round from NW by W to S, and the lower, which on the surface is SE or SSE, assuming a more southerly direction at a higher level. In consequence, the mass of clouds drifts northward along the mountain, while straggling patches flit in the same direction across the zenith, and even along the eastern hemisphere.
6 0 The upper clouds remain more stationary, the lower drift rapidly northw'ds.
7 0 Clouds thinly broken over zenith. Mass drifting northward along the mountains.
8 0 Entirely clouded. Wind rising.
9 0 Stars pretty clear towards the east.
10 0 Stars clear in all quarters.
11 0 Beautiful starlight night.
12 0 Stars superb. Definition in telescope excellent.
13 0 " A touch of cloud on the Devil mountain.
14 0 " Now and then a transient haze.

h. m.
15 0 Stars superb. An occasional flying cloud in E horizon, travelling northw'd.
16 0 " At 15h. 40m. twilight begun.
17 0 Sun just clear of the Hottentot Holland mountains, and the thin fleecy layer of cloud which caps them.
17 7 Sun gaining brightness. Can no longer be looked at.
17 10 Glorious morning. SE breeze balmy and delicious.
17 31 Sun begins to feel warm.
17 41 " "
18 0 Brilliantly pure and serene sky. Only over the lower (southern) part of the Table range, from Constantia up to the main bank, a dense fleecy cloud pours inwards (or from the W,) indicating a W wind on the other side of the hill. N. B. This difference of winds on the opposite sides of the Table range is very common, and is the cause of many peculiarities of this climate.
18 37 Two observations of the actinometer gave 17.8 and 19.4, but were rejected on discovering the cause, viz: the two penumbræ of a small forked dead branch, which I had not noticed when placing the instrument.
18 51 Sun now feels hot, and shade becomes desirable.
19 0 The fleecy cloud still pouring over the mountain, (as above, 18h.) A slight flock or two now appears on the main bank, which pours over like the rest, dissolving as it descends.
19 53 Edge of a great cirro-cumulus close to, but not on, the sun.
19 59 Sun wholly involved in the cloud, but still it casts a shadow.
20 2 A conflict of winds commencing. Here it is N, but on the flats to the E it is evidently still SE. The struggle is marked by a belt of cirro-cumulus where the winds mix, curiously moving in intricate eddies, but all finally drifted from W to E.
20 23 No cloud on or near sun, but a great glare 10 or 15 degrees round it.
21 0 Great cirro-cumuli over the mountain.
21 10 No cloud on or near sun, but a great degree of white glare.
22 0 Cirro-cumuli to SE.
22 30 Rather less white glare about sun. No cloud near.
22 51 The brown glass shows a faint cirrus forming on the sun.
22 55 Cirrus gone off, but another approaches, and rapidly increases in size and density. A general formation of cirro-cumuli going on.
23 0 Patches of blue sky, chiefly in SE, among cirro-cumuli. Wind aloft feeble, N or NW. Below, variable, from N and S alternately. Sun too much clouded for actinometer.

Dec. 22.

0 0 Upper wind feeble NW. Cirro-cumuli in great masses, distributed over all but S and SE quarters.
0 21 Cirri near, but not on, sun. Actinometer gave 33.75 when the edge of a faint cirrus was on sun.
1 0 Clouds in and near zenith. Sun clouded. Wind, for the last hour, in gusts (=6) and lulls.
1 50 Sky clearing rapidly as the gusts freshen from the SE, and the lulls grow less frequent.
2 0 Remarkable conflict of NW and SE winds. The latter sweeps over the flats, and all the clouds dissolve as it gains strength. The former still persists in driving voluminous clouds over the lower parts of the T. mountain as far as Constantia, while some fleecy portions pour over the main bank and curl round the peak of the Devil mountain.
3 0 The NW cloud pours in huge cottony bales over the lower parts of the Table range. Then comes a zone of clear blue parallel to the range; then a belt of fine reticulated cirro-cumulus, through whose western edge the sun, viewed through the brown glass, appears encircled with a double colored halo.
4 10 The whole W hemisphere now thickly overcast, and finely mackarelled banks, mixed with cirrus, are drifting E and S, high above level of the mountain. Sun obscured.
5 0 Clouds advancing thick and rapidly from W. Devil and Table mountains still clear.
6 0 Clouds still high, but threaten rain.
7 5 Clouds of a yellowish rainy appearance. They move very slowly, more from N than W.
8 0 Sky clears rapidly. Moon's dark limb most distinct.
9 0 Perfectly clear starlight. Stars in 20ft. refl. beautifully defined and tranquil.

TABLE XXII.

METEOROLOGICAL OBSERVATIONS

For the March Equinox, 1836, *made at Feldhausen, near Wynberg, Cape of Good Hope.*

By Sir John F. W. Herschel.

Day and hour astronomically reckoned. (M. T.) 1836.	Bar. corrected for error of zero.	Temp. of mercury in barometer.	External Thermom.		Actinometer.		Wind.		Estimated quantity of blue sky.	Terrestrial radiation. Radiant thermometer.
			Dry.	Wet.	Effect of solar radia.	Time of observation. (M. T.)	Direction.	Force.		
20th.										
8 0	29.886	68.5								
13 32	29.872	68.5								
17 0	29.872	69.0	62.0	60.8	.....	..... .	SW SSE	1 2	0	up. cur. low. "
18 30	29.897	69.0	61.6	57.8	0	.....	SW SSE	1 2	1	
19 0	29.902	69.0	62.0	56.8	0	.....	NW SSE	1 1	1	
20 0	29.922	69.0	64.8	58.3	0	.....	NW ——	1 0	0	
21 0	29.934	69.0	67.0	57.3	0	.....	NW SSE	1 1	0	
22 0	29.933	68.5	68.3	58.4	0.10	gleams.	W N	1 2	2	
23 0	29.931	68.8	70 0	58.5	0.25	"	NW N	1 1	3	
21st.										
0 0	29.922	68.5	71.1	60.3	.....	.....	S S	1 1	0	
1 0	29.922	69.0	71.5	59.5	0.5	faint gleams.	S S	1 2	0	
2 0	29.922	68.6	69.0	59.8	15.25	gleams.	SW S	1 1	1	
3 0	29.909	68.5	71.0	59.2	25.30	In clear mome't	NW NW	1 2	6	
4 15	29.902	68.0	68.2	57.1	30	Estim.	—— ——	.....	9	
5 10	29.910	67.3	64.9	56.0	25	Estim.	—— WNW	— 2	9	
6 0	29.918	67.5	63.1	55.8	.....	.....	.....	0	8	
7 0	29.924	67.3	63.3	56.3	.....	.....	SW SW	1 1	1	62.5
8 10	29.938	66.8	62.9	55.0	.....	.....	SW ——	1 0	0	62.2
9 0	29.938	66.0	61.0	53.1	.....	.....	.....	0	8	56.4
10 7	29.938	66.0	61.3	53.8	.....	.....	.....	0	0	60.4
11 5	29.926	66.0	61.0	53.1	.....	..... .	—— S	— 1	3	58.8
12 0	29.938	68.0	59.1	51.7	.....	.....	.....	0	10	55.3
13 0	29.928	68.0	55.4	49.9	.....	... .	.....	0	10	50.7
14 0	29.928	68.0	58.1	50.9	.....	.....	W W	2 1	5	53.9
15 10	29.923	68.3	58.9	53.1	.....	.....	.....	0	0	
16 0	29.921	68.0	59.2	53.3	.....	.....	.....	0	0	

TABLE XXII, (CONTINUED.)

Day and hour astronomically reckoned. (M. T.) 1836.	Bar. corrected for error of zero.	Temp. of mercury in barometer.	External Thermom.		Actinometer.		Wind.		Estimated quantity of blue sky.	Terrestrial radiation. Radiant thermometer.
			Dry.	Wet.	Effect of solar radia.	Time of observation. (M. T.)	Direction.	Force.		
17 10	29.933	68.0	60.0	54.5	.....	... .. .	.....	0		
18 0	29.944	68.5	60.5	54.8	.....	..... .	.....	0		
19 0	29.952	67.0	60.7	55.3	.....	.....	.....	0	8	
20 0	29.956	67.0	67.3	58.5	.....	.....	.....	0	9	
21 0	29.957	67.0	72.5	58.1	.....	.....	W	1	2	
22 0	29.957	67.0	68.6	57.8	.....	.....	"	1	5	
23 0	29.944	67.0	69.7	57.3	.....	.....	"	2	8	
22d,										
0 0	29.928	67.3	69.7	58.3	31.32	0 26	SSW	1	9	
1 0	29.912	67.5	71.5	59.7	27.90	1 14	NW	1	8	
2 0	29.896	67.5	71.2	59.0	30.06	2 15	"	1	9	
3 4	29.890	67.3	72.4	58.8	22.40	3 22	"	1	8	
4 0	29.896	67.3	70.0	57.5	24.48	4 29	.....	0	9	
5 0	29.907	67.4	67.8	57.8	19.40	4 54	.....	0	9	65.7

These observations are freed from instrumental error, the zero corrections being all applied. The barometer is brought to a correspondence with the Royal Society's standard, by application to its readings of the constant correction +0.062; the thermometer to a standard by Newman, (the dry external thermometer.) which has been found to agree precisely with the standard thermometer of the Royal Society. The height of the station of observation has been ascertained to be (within a foot or two) 115 feet above the floor of the circle room in the Royal Observatory, whose presumed elevation above the sea is about 30 feet.

REMARKS ACCOMPANYING TABLE XXII.

h. m.

17 0 The morning dull and dark. Slight rain had fallen in the night.

18 30 No more signs of rain: all things looking brighter, as if about to clear for a southeaster.

19 0 Clouds high, at least 3,600 feet, as neither the Table nor Devil mountain is touched.

20 0 "

22 0 Sun hitherto obscured, now occasional gleams.

March 21.

0 0 A day of conflicting winds, which (as usual in this locality) settle their differences by conference or contest over the summit of the Table mountain, especially over its eastern slope, on which this station is situated. State of sky, as to clouds, in consequence, never the same for five minutes—now brilliantly clear, now generally obscured; the actinometer observations could therefore not be prosecuted; and the numbers set down during the 21st are mere estimations of the solar heat, in occasional gleams, during the *subsequent* hour, grounded on long experience of the sensations of heat corresponding to different indications of the instrument.

9 0 The radiant thermometer was a small and extremely delicate thermometer by Crichton—(one of the four used by Sir William Herschel in his experiments on solar heat.)—closely wrapped in black crape, and suspended about two inches over the centre of a highly polished metallic mirror, 19 inches in diameter, and 20 feet focal length, laid horizontally, face upwards. The night proved unfavorable for the observation, and the day following the sun interfered and nullified the results On the whole, this is little to be regretted, the nature of the observation being such as to lead to no definite conclusion. I should observe, that there is no advantage in the usual form of parabolic reflector of silvered copper used in this experiment, nor need any regard be paid to placing the thermometer in or near the focus. It is sufficient if the polished surface subtend an angle of nearly 180 degrees at the thermometer. An extensive reflecting surface of mercury, from its great brilliancy and easy extempore preparation, would, no doubt, answer extremely well. After all, the *whole* terrestrial radiation can be got rid of by no contrivance, nor can the fraction remaining be (even approximately) estimated by any method I am acquainted with.

13 0 Sky dull, though clear of all visible cloud; none on the mountain. Definition of stars in the twenty feet reflector good.

14 0 Clouding suddenly from the west, by a vast sheet of dense cloud, which has just attained the zenith, and is sharply terminated: as it advances, a gentle west wind begins to stir. No shooting stars noticed to-night.

15 10 Pitchy cloud obscuring every part of the sky. A perfect calm.

March 22.

0 0 Owing to the pressure of other business, the actinometer could not be observed before this hour; but the sky has never been sufficiently clear to make the omission of any importance. Cirrous streaks and wisps in horizon.

1 0 Much visible cirrous haze on sun increasing, and diminishing momentarily. Actinometer, in consequence, extremely variable. Three observations gave 25.6, 28.1, 30.0, as the haze gradually cleared.

2 0 Variable wind, or rather alternate gentle breezes from NW and S or SW: on the whole, however, the former prevails. (N. B. This was the first symptom of a great north-wester, which brought heavy rain about 6 P. M. next day, March 23.)

3 4 Strong cirrous veil over the sun.

4 0 Sun very dull, and getting low.

5 0 Sun pretty clear, but too low for convenient observation.

NOTE.

It has been thought advisable to reprint the following "Explanation of the principles and construction of the Actinometer, by Sir John F. W. Herschel, F. R. S." from the Report of the Third Meeting of the British Association for the Advancement of Science.

"This is an instrument invented by Sir J. F. W. Herschel, for measuring at any instant the direct heating power of the solar rays.

"In the ordinary methods of estimating the sun's calorific effect, the heating power of the sun is put in equilibrium with the cooling influence of external causes, and the elevation of temperature in the body (usually a thermometer,) thus heated, so as to maintain the equilibrium, is noted and set down as a measure of the sun's calorific effect. But the principle of such a proceeding is obviously faulty: the temperature maintained is just as properly a measure of the cooling as of the heating influences, and, in fact, is a measure neither of one nor the other. This objection applies to all *statical* measurements of *dynamical* effects, taking the word generally to mean cases where *power* is transformed into its immediate effect, and exhausted by such transformation. The Actinometer is intended to afford a dynamical measure of the solar radiation, i. e. one in which the actual quantity of heat received per second, or in a given infinitely small time, is the object of measurement, upon a given surface directly exposed to the sun. The instrument itself is nothing more than a very large cylindrical thermometer-bulb with a scale greatly enlarged, so as to render the smallest possible increase of temperature distinctly measurable. In consequence, the scale is not divided into degrees, but into arbitrary equal parts, and as a very slight elevation of temperature suffices to carry the liquid up the whole column, the bulb itself is furnished with a screw, by withdrawing which its capacity may be enlarged, and the power of reading off restored. The bulb is of colorless glass, and is filled with an intensely blue liquid. Into the interior of this, the caloric rays penetrate, and are absorbed at some sensible depth within the bulb, so that the liquid is heated *from within*, and the *whole* of the calorific rays (not stopped by the glass) go to dilate the contents, and are extinguished in producing that effect. To make an observation with the Actinometer, the instrument must be freely exposed in the shade for one minute, and the variation of the reading noted: then freely exposed to sunshine for the same time, and the variation again noted: and lastly, once more, in the shade. The mean of the two variations in the shade being subducted from the variation in the sun, the excess gives the dilatation *per minute* due to the sun's rays; the quantity subducted being the effect of the other causes in action at the time.

"The Actinometer, as used by Sir John Herschel, is made and sold by Mr. Robinson, optician, Devonshire-street, Portland-Place, London."

ART. X.—*Report of the Committee appointed to continue the* METEOROLOGICAL OBSERVATIONS, *on the* 21*st of March, June, September and December,*

Containing hourly observations of the Barometer, Thermometer, Winds, Weather, &c. made at different places on the 21*st and* 22*d of December,* 1836—*and meteorological tables from Illinois, Florida, New-York City, Albany, Montral, Quebec, L. C. and Amsterdam in Holland.*

[Accepted March 2, 1837.]

In compliance with the resolution of the Institute, the committee on meteorology present the following

REPORT.

More than a year has elapsed since it became known in this country, that the South African Literary and Philosophical Institution had, on the suggestion of Sir John F. W. Herschel, determined to set apart four days in each year to be devoted to a most scrupulous and accurate registry of the state of the barometer and thermometer; the direction and force of the wind; the quantity, character and distribution of clouds, and every other particular of weather throughout the whole 24 hours of those days, and the adjoining 6 hours of the days preceding and following, reckoned astronomically. And to recommend a similar determination to meteorologists in every part of the world, with a view to the better determining of the laws of the diurnal changes taking place in the atmosphere, and to the obtaining of a knowledge of the correspondence of its movements and affections over great regions of the earth's surface or even over the whole globe. The days fixed

upon were the 21st of March, the 21st of June, the 21st of September, and the 21st of December, being those or immediately adjoining to those, of the equinoxes and solstices, in which the solar influence is either stationary or in a state of most rapid variation. But should any of those 21st days fall on Sunday, then it will be understood that the observations are to be deferred till the next day, the 22d. The observations at each station should commence at 6 o'clock, A. M. of the appointed days, and terminate at 6 o'clock, P. M. of the day following, according to the usual reckoning of time at the place. During this interval, the barometer and thermometer should be read off and registered hourly, or at all events at intervals not more than two hours asunder, and the precise hour and *minute* of such reading should be especially noted.

Impressed with the belief that the adoption of a similar determination on the part of the Institute would tend to spread a knowledge of the design, and secure an extensive co-operation throughout our country, a committee of its members having made the best preparations in their power, made the suggested observations on the 21st of December, 1835, at the apartments of the Institute. The record of these observations, together with a brief notice of the plan, was published and generally distributed, and the request made at the same time, that those who were willing to unite with us should communicate their observations. The result has proved that our expectations were well founded. Immediately on this publication, we had the pleasure to learn that simultaneous observations had been made by John S. McCord, Esq. an officer of the Natural History Society of Montreal, who has been unwearied in his efforts to establish new stations throughout the British Provinces. The succeeding appointed days have been observed at numerous and distant points of our country, and the Transactions of the Institute contain, in addition to those made at the apartments of the Royal Society of London, and by Sir John Herschel near the Cape of Good Hope, which were reprinted from the London Athenæum, observations made at Albany, Montreal, Quebec, Flushing, L. I., New-York city, Middletown and New Haven, Conn.; Williamstown, Mass.; Baltimore, Maryland; Cincinnati, Ohio; Gardiner, Maine; and Burlington, Vermont. As showing not only the feeling with which our co-operation has been received abroad, but for the important suggestions made by Sir John Herschel, the committee beg leave to incorporate with their re-

port, the following extract of a letter received from him by the secretary of the Institute:

"*Feldhausen, near Wynberg,*
Cape of Good Hope, Sept. 30, 1836.

"Sir—I have just received, through the favor of the Secretary of the Royal Society, the meteorological observations made at the Albany Institute on the 21st and 22d of December, 1835. I am truly rejoiced to find this readiness of co-operation at a station of so much importance, and I beg that you will return my best thanks, personally as well as in the name of the institution here, over which I have the honor for the present to preside, and to which your communication has been made, to the president and council of your institution and especially to the committee of its members who have undertaken with such alacrity and performed with so much apparent care, the somewhat harrassing observations required. We will indulge the hope that they will be continued on succeeding occasions and communicated in like manner, and I have no doubt when one or two years' observations shall have thus accumulated from the now numerous and continually increasing stations which have placed themselves in correspondence with us, that from their comparison, results of a general and important nature will not fail to arise.

"Permit me to suggest, that in continuing the observations until an opportunity shall occur of ascertaining by direct or intermediate comparison with some standard of authority, the zero point of the barometer, (or by instituting some direct inquiry into the absolute length of the mercurial column, by actual measurement,) it would be desirable that the same instrument should be employed, (unless there be reason to fear that in transporting it from its usual place its zero should change,) and that any opportunity which may occur of comparing it with other barometers should be seized.

"In addition to the observations heretofore made, that of the temperature of the soil at 6 or 8 feet below the surface, or of the water *at the bottom* of a deep well, which would give very little additional trouble—as one or two observations on each day would suffice—would be valuable as leading by the shortest course to a knowledge of the mean temperature of the station."

The committee now present the observations made by Sir John Herschel in June, and those of the 21st of December last, which have been sent to the Institute; abstracts of meteorological regis-

ters at Springfield, Illinois, from Dr. Meade; and Key-West, Florida, from Lieut. Alvord, U. S. A.; a communication from William C. Redfield of New-York, one of our corresponding members containing the results of his daily meterological observations for the years 1835 and 1836; an abstract of meterological observations made in the city of Albany during the year 1836 by M. H. Webster; meteorological register of Mr. McCord of Montreal; a statement of the annual means and extremes of the barometer and thermometer at Cape Diamond, Quebec, by J. Watts, superintendant of telegraphs in Canada, for several years; and a similar statement of the annual means and extremes of the barometer and thermometer at Amsterdam, in Holland, from G. A. Vandervoort of that city.

With regard to the horary observations on the 21st of December, the committee regret that those made at Cincinnati, Middletown, Baltimore and Burlington, have not yet been received.—And this is the more unfortunate, as the period embraced in it was characterized by the termination of a very extensive inland storm, and would furnish more precise data with regard to its movement than have hitherto been collected. Of this storm, the following additional particulars derived from the newspapers are deemed worthy of being here brought together:

At New-Orleans, at 2 P. M. of the 20th Dec., a southerly storm, accompanied by a heavy shower of rain. In the evening a strong gale blew from the north. At Natchez, the barometer had been falling from the the 18th, on which morning it was 30.10, until the morning of the 20th, when it stood at 29.64; at 4 P. M. the thermometer was falling and the barometer rising; in the morning there had been showers, thunder and rain; in the afternoon it was windy and clear; the wind changed from S. in the morning, to S. W., W. and N. W. in the afternoon.—*Mr. Tooley's met. reg.*

At Cincinnati on the 20th between 11 and 12 A. M. it began to rain, with a strong wind blowing from S. E. The thermometer rose to 51° and the barometer fell in a few hours from 29.27 to 28.73. About 9 P. M., a little more than an inch of rain having fallen, the thermometer still standing at 51° the wind shifted suddenly to the S. W. and W. S. W. and a rapid change commenced. The rain ceased, the winds blowing in strong gusts with a little snow, amounting in all to less than a tenth of an inch; until the

21st at 8 A. M. the thermometer had fallen 40° in 11 hours, and stood at 11°. The barometer had risen in the same time nearly an inch.—*Prof. Locke in Cincinnati Gazette.*

At Buffalo, there was during the night of the 20th, a tremendous gale from the westward. At Rochester a severe gale in the afternoon from S. E., veering round to W. during the night.

These particulars, together with those contained in the annexed tables, respect a storm extending over a distance of more than 2000 miles.

All of which is respectfully submitted.

M. H. WEBSTER,
P. TEN EYCK,
JOHN V. L. PRUYN,
HORACE WEBSTER,
Committee.

TABLE I.

Hourly Meteorological Observations for the June Solstice of 1836, *made at Feldhausen, near Wynberg, Cape of Good Hope by* Sir John F. W. Herschel.

No.	Time by Astronomical reckoning.	Barometer corrected for Zero Error.	Temp. of mercury in Barometer:	External Thermometers.		Actionometer.		Wind.		Blue Sky.	General state of the Weather.
				Dry.	Wet.	Solar Radiation.	Time of Observation.	Direction.	Force.		
1	2	3	4	5	6	7	8	9	10	11	12
	M. T. h. m.	in. dec.	Fahr. ° dec.	Fahr. ° dec.	Fahr. ° dec.	Parts of Scale.	h. m.		Duodec.	Dec.	
	June 21.										
1	0 0	30.190	57.0	57.5	54.9	0	.....	NW	2	0	Overcast, with passing temporary showers, and gloomy dark weather.
	Noon.										
2	1 0	30.170	57.0	58.0	55.3	.....	.....	NW	2	0	
3	2 0	30.168	57.2	57.8	55.3	0	.....	NW	1	0	
4	3 0	30.171	57.5	57.5	55.1	0	.....	NW	1	0	
5	4 0	30.159	57.0	56.2	53.8	0	.....	NW	0	7	Cloudy.
6	5 0	30.154	56.9	53.8	51.3	0	.....	.....	0	9	
7	6 0	30·151	56.5	52.3	50.1	.....	.....	NW	1	10	
8	7 0	30.151	56.5	51.0	49.1	.....	.....	.....	0	10	
9	8 0	30.152	56.5	49.7	47.8	.....	.....	.....	—	8	Misty, hazy atmosphere.
10	9 0	30.152	56.3	48.5	47.1	.....	.....	.....	0	0	Thick fog—sky overcast, with impervious clouds.
11	10 0	30.162	59.0	48.6	47.7	.....	.....	.....	—	0	
12	11 0	30.148	59.0	49.0	48.3	.....	.....	NW	1	0	
13	12 0	30.143	59.0	49.1	48.5	.....	.....	NW	1	1	Misty, hazy atmosphere.

	Midnight										
14	13 0	30.140	58.8	48.3	47.8	.....	.....	0	0	0	Ovct.—drizzling rain.
15	14 10	30.138	58.8	44.6	44.1	.....	.....	NW	1	10	
16	15 0	30.132	58.5	45.7	45.2	.....	.....	NW	1	4	} Misty, hazy atmosphere.
17	16 0	30.116	57.7	46.6	46.2	.....	.....	NW	1	2	
18	17 0	30.112	58.0	47.1	46.5	.....	.....	NW	2	6	
19	18 0	30.112	58.0	47.4	46.8	.....	.....	.....	0	8	
20	19 0	30.134	58.0	47.8	47.5	.....	.....	.....	0	9	
21	20 0	30.126	58.0	50.2	49.5	.....	.....	.....	0	9	
22	21 0	30.125	58.0	55.5	52.3	.....	.....	.....	0	9	
23	22 0	30.112	59.0	59.8	52.8	24.1	22 33	NW	2	8	
24	23 0	30.093	61.9	61.4	52.3	23.5	23 45	NW	4	8	
	June 22.										
25	0 0	30.048	61.0	62.0	52.1	.....	....	NW	6	7	
	Noon.										
26	1 0	30.054	61.0	61.3	52.3	25.0	1 6	NW	4	7	
27	2 0	30.027	61.0	60.2	52.3	.....	.....	NW	4	1	Cloudy dark weather.
28	3 0	30.027	60.0	61.5	52.5	.....	.....	NW	5	0	Overcast—ditto.
29	4 0	30.016	60.0	59.6	52.5	.....	.....	NW	5	3	Threatening ap. of weath.
30	5 0	30.050	60.0	58.3	52.8	.....	.....	NW	2	1	Overcast and gloomy.
31	6 0	30.048	62.0	58.7	51.5	.....	.....	NW	4	1	} Cloudy—misty, hazy
32	12 0	30.076	59.2	.....	.....	.....	.....	NW	5	2	} atmosphere.
	Midnight										

In the above observations the Zero corrections of all the instruments used *are applied*, so that the numbers in the several columns stand free from *instrumental error*, the Barometer being brought to correspondence in its readings with the Royal Society's standard, corrected *for capacity*, but not for capillarity, nor for temperature, or height above the sea level. The Thermometers are all brought to correspondence with a standard by Newman, superintended by Mr. Daniell, which was found to be in exact agreement with the standard of the Royal Society. The Zeros applied to the readings, for this purpose, were as follow : col. 2, 0m. 0s. ; col. 3, + 0in. 062 ; col. 4, − 0° 95′ , col 5, 0° 00′ ; col. 6, + 0° 25′.

TABLE II.

Meteorological Observations made at the Apartments of the Royal Society, Somerset House, for 37 successive hours, commencing at 6 A. M. of the 21st of December, 1836, and ending 6 P. M. of the following day.

(*Greenwich mean time.*)

By Mr. J. D. Roberton, Assistant Secretary, Royal Society.

Hours of Observation.	Barometer corrected.	Attach. Ther.	Ext. Ther.	Rain in inches.	Wind.	*Remarks.*
6 A. M.	30.271	45.7	41.0		SSW	Foggy—deposition—light wind.
7 ..	30.273	45.8	41.2		SSW	do do
8 ..	30.269	45.7	42.0		SSW	do do
9 ..	30.279	46.0	42.8		SSW	do do
10 ..	30.293	46.2	44.3		SSW	do do
11 ..	30.291	46.4	45.1		SW	do do
12 ..	30.281	46.7	45.8		WSW	do do
1 P. M.	30.287	47.0	46.5		W	do do
2 ..	30.292	47.2	46.3		W	do do
3 ..	30.285	47.2	46.3		W	Overcast—light wind and fog.
4 ..	30.294	47.0	46.2		WSW	do do
5 ..	30.293	47.0	46.4		SW	do do
6 ..	30.296	47.0	46.7			do do
7 ..	30.311	47.0	47.0			do do
8 ..	30.320	47.0	46.8			do do
9 ..	30.329	47.2	46.9			do do
10 ..	30.340	47.2	46.4			do do

11 ..	30.348	47.0	45.7		Dark broken clouds—light wind and fog.
12 ..	30.346	47.0	45.0	SW	do do
1 A. M.	30.348	46.0	44.6	SW	do do
2 ..	30.356	46.7	44.8	SW	do do
3 ..	30.362	46.8	45.0	SW	do do
4 ..	30.356	46.7	45.2	SW	do do
5 ..	30.354	46.7	45.0	SW	do do
6 ..	30.348	46.6	45.0	SW	do do
7 ..	30.352	46.7	44.6	SW	do do
8 ..	30.368	46.4	43.0	SW	do do
9 ..	30.378	46.4	42.8	SW	do do
10 ..	30.388	46.3	43.5	SW	do do
11 ..	30.378	46.5	44.0	SW	do do
12 ..	30.354	46.7	45.0	SW	A very dark cloud taking its course rapidly to SE.
1 P. M.	30.321	47.1	45.4	SW	Much lighter, but still very cloudy.
2 ..	30.294	47.2	46.0	SW	Cloudy—light wind.
3 ..	30.273	47.3	46.4	SW	do do
4 ..	30.245	47.3	46.5	SW	do do
5 ..	30.220	47.3	46.8	SW	do do
6 ..	30.190	47 3	47.6		do do
	30.313	46.7	44.6		

TABLE III.

Meteorological observations, made at the Apartments of the Albany Institute, Albany Academy, for 37 successive hours, commencing 6 A. M. of the 21st of December, 1836, and ending 6 P. M. of the following day.

(*Lat.* 42°39′3″ *N.; Long.* 73°46′38″ *W.*)

By a Committee of the Institute.

Hours of Observa'n.	Barom corrected.	Attach. Therm.	Ext. Therm.	Wet Bulb Therm.	Dew Point.	Rain.	Direc. Wind.	Force Wind.	*Remarks.*
6 A. M.	29.588	50.00	49.00	49.00	49 °	....	SE	high	Very violent rain.
7 ..	29.571	50.75	49.40	49.00	48	....	S	"	Rain dim'g. At 7¼, dense fog; ½ past, fog ris. scuds mov'g fr. S.
8 ..	29.505	51.50	50.00	50.00	50	.935	S va	"	Rain nearly ceased—scuds from SE.
9 ..	29.427	54.25	53.00	52.50	52	....	S	mod.	Overcast—scuds fr. S.
10 ..	29.405	55.50	53.50	51.50	50	.005	S	mod.	Rain— do [fr. NW., rain & hail, w. va. WtoNW.
11 ..	29.397	52.60	51.40	50.00	50	.009	S	mod.	do do 11h. 10m. Wind NW., dark clouds, scuds
12 ..	29.596	34.00	33.50	32.00	33	.191	NW va	high	Hail and snow.
1 P. M.	29.684	31.50	30.60	27.00	28	.095	NW	mod.	Snow slight.
2 ..	29.757	31.00	29.25	26.00	28	....	NNW	"	do
3 ..	29.775	28.50	27.50	24.00	21	....	NNW	"	Clearing up.
4 ..	29.826	27.75	26.10	22.00	16	....	"	"	Western half of sky clear; eastern covered with clouds.
5 ..	29.875	24.25	23.00	19.50	8	....	"	"	Clear—heavy clouds in S. and E. horizon.
6 ..	30.009	22.00	20.50	17.00	1	....	NW	"	Clear.
7 ..	30.050	20.00	18.25	15.50	....	....	"	high	Clear—capsule of hygrometer bright—3°.
8 ..	30.080	18.00	16.50	14.00	....	....	"	"	Clear— do do do —6°.
9 ..	30.142	17.00	15.50	13.00	....	....	"	brisk	do orange colored haze around the moon for a large extent.
10 ..	30.215	16.25	13.50	12.50	....	....	"	"	do do do do do

11	..	30.225	16.00	14.00	12.00	....	....	"	"	do	do	do	do	do
12	..	30.230	16.00	14.00	11.00	....	....	"	"	do				
1	A. M.	30.325	16.00	13.50	11.00	....	....	"	"	do				
2	..	30.350	16.00	13.50	11.00	....	....	"	"	do				
3	..	30.335	16.00	13.00	11.00	....	....	"	"	do				
4	..	30.328	15.00	12.80	11.00	...	....	"	"	do				
5	..	30.358	15.00	12.50	10.50	....	...	WNW	"	do				
6	..	30.360	14.00	11.80	9.50	....	....	"	"	do				
7	..	30.359	14.25	11.50	10.00	....	....	"	"	do				
8	..	30.514	14.50	11.90	10.00	....	....	"	"	do				
9	..	30.519	16.50	14.00	11.00	....	....	NW	"	do				
10	..	30.537	19.00	16.25	12.50	....	....	"	"	do				
11	..	30.538	18.50	16.80	13.00	....	....	"	"	do	with a few clouds in W.			
12	..	30.544	20.50	18.50	13.50	....	....	"	"	Cirrus clouds.				
1	P. M.	30.532	21.00	19.50	14.00	....	....	"	mod.	do	and cirro-cumulus clouds.			
2	..	30.532	21.00	19.90	15.00	....	....	"	"	Cloudy.				
3	..	30.552	19.00	18.00	14.00	—4	....	"	"	Cumulus clouds moving from NNW.				
4	..	30.559	18.50	16.50	14.00	—1	....	"	"	Clear in zenith—cum. and cir. cum. and stratus.				
5	..	30.570	17.80	14.75	12.00	2	....	"	"	do	—except low stratus in horizon.			
6	..	30.552	17.00	13.00	12.00	2	.. .	"	"	do	—wind has been gradually decreasing.			
Mean		30.127	25.03	23.14	20.60		1.235							

Barometer and other instruments, except external thermometer, which was the one used in September, same as in June. Time ascertained by the transit instrument. Rain commenced at 10 P. M. of the 20th, with high wind.

Dec. 19th, 9 A. M.—Bar. 30.69—Att. Ther. 28—Wind S.—Clear.
6 P. M.— " 30.64 " 29½ " S. "
Dec. 20th, 9 A. M.— " 30.52 " 29½ " S. "
6 P. M.— " 30.32 " 33½ " S. E. Cloudy.

Max. Bar. 30.570, 5 P M. 22d.—Ther. 53°50, 10 A. M. 21st.
Min. " 29.397, 11 A. M. 21st " 11 50, 7 A. M. 22d.
Range " 1,178, 42 00.

TABLE IV.

Meteorological observations, made at Montreal, L. C., for 37 successive hours, commencing at 6 A. M. of the 21st December, 1836, and ending 6 P. M. of the following day.

(*Lat. 45°.30′ N. Long 73°.22′ W.*)

By John S. McCord, Corresponding Secretary of the Natural History Society, Montreal.

The hours of observation.	Barom. apparent height.	Attached Ther.	External Ther.	Direction of wind.	Force.	*Remarks.*
6 A. M. 21	29.462	60.0	40.0	S.	2	Steady rain; wind lulled a little.
7 " "	29.372	60.0	42.0	S.	4	do blowing a gale.
8 " "	29.336	60.0	45.0	S.	4	Cloudy; blowing a gale.
9 " "	29.270	60.0	44.0	S.	3	Cloudy; blowing hard.
10 " "	29.350	60.0	38.0	S.W.	4	Rain; blowing hard.
11 " "	29.396	60.0	34.0	"	3	do do
12 " "	29.400	61.0	33.0	"	3	Cloudy; blowing hard, ¾ past 12 hail storm lasted 15 minutes.
1 P. M. "	29.480	60.5	30.0	"	4	Cloudy; blowing very hard; beginning to snow.
2 " "	29.564	60.5	26.5	"	4	Snow, (fine and hard;) blowing very hard.
3 " "	29.620	60.0	25.0	"	3	do do. drifting.
4 " "	29.715	60.0	25.0	"	3	Beginning to clear in the west.
5 " "	29.741	61.0	22.0	"	3	Clear.
6 " "	29.800	61.0	20.0	"	3	do
7 " "	29.850	61.0	18.0	"	3	do bright moonlight.
8 " "	29.900	61.0	17.0	"	3	do do
9 " "	29.950	61.0	15.0	"	3	do do
10 " "	29.990	61.0	14.0	"	3	do do

11	"	"	30.036	61.0	13.0	"	2	do	do
12	"	"	30.066	61.5	12.0	W.	2	do	do
1	A. M.	22d.	30.114	61.5	12.0	"	1	do	do
2	"	"	30.150	61.5	11.0	"	1	do	do
3	"	"	30.178	61.0	10.5	"	2	do	do
4	"	"	30.214	61.0	10.0	"	2	do	do
5	"	"	30.236	61.0	10.0	"	2	do	do
6	"	"	30.270	61.0	9.0	"	2	do	do
7	"	"	30.300	61.0	9.0	"	2	do	
8	"	"	30.348	60.0	8.0	"	2	do	
9	"	"	30.390	60.0	9.5	"	2	do	
10	"	"	30.430	60.0	11.0	"	2	do	
11	"	"	30.444	60.0	12.0	W. N.W.	2	do	☞ range of Bar. during 37 hours, 1.25 in.
12	"	"	30.450	60.0	13.0	"	2	do	Ex. Ther. do do 35°
1	P. M.	"	30.450	60.0	13.0	"	2	do	
2	"	"	30.460	60.0	15.0	"	2	do	
3	"	"	30.486	60.0	15.0	"	2	do	
4	"	"	30.500	60.0	12.0	"	2	do	
5	"	"	30.500	60.0	10.0	"	2	do	
6	"	"	30.520	60.0	10.0	"	2	do	
Mean,.....			29.993	60.5	19.28			Bar. cor'd for cistern, capillitary, & reduced to 32°F. 29.975.	

The instruments the same as on former occasions.

TABLE V.

State of the Atmosphere (at Cape Diamond, Quebec, L. C., Lat. 46° 48′ N. Long. 71° 15′ W. of Greenwich,) as determined on the 21st of December, 1836, and a part of the day before and after it, taken at three hour intervals.

By J. Watt, Esq., Superintendent of Telegraphs in Canada.

Date.		Barometer.	Thermometer, Fahrenheit's.		Wind.		Weather, &c.
Day.	Hour.		Attached.	Detached.	Course from	Velocity in British miles.	
		Inches.				About per hour.	
20th,	Noon.	30.44	48°	29°	E. N. E.	15	Hazy.
	3	.37	49	27	do	15	Clear.
	6	.31	48	21	do	15	Clear.
	9	.22	48	21	S. W. by the clouds, N. E. on earth,	36 2	Cloudy; (white.)
	Midnight	.13	47	21	S. W. by W.,	15	Clear.
21st,	3	29.84	40	27	S. W. by W.,	15	Clouding.
	6	.55	38	33	S. E. by E.	25	Rainy.
	9	.33	43	39	S. E. by E.	46	do (drizzling.)
	Noon.	28.82	51	44	Do. by the clouds, S. on earth,	55 55	A sleety tempest.
	3	29.13	47	29	W. by S.	60	Snowing in great flakes.
	6	.36	47	21	do	37	do do

	9	.50	41	14	do	45	Driz'g; but grew clear.
	Midnight	.76	41	8	do	45	Snowed 1h. then cleared
22d,	3	.96	39	3.	do	45	Clear; (very.)
	6	30.15	34	—2	W. by N..	20	do
	9	.31	34	4.	do	20	do
	Noon.	.39	34	3.	do	20	do

The barometer and thermometer (F.) are good instruments: no air over the mercury. Their position is 330 feet above the level of the sea, at half tide. The barometer is read at the top of the cylinder; convexity and concavity are disregarded, for in taking the mean, of a long series, the one balances the other, nearly. No corrections made. The register is entered direct from the instruments.

TABLE VI.

Meteorological Observations, made at the Institute, Flushing, L. I., for 37 successive hours, commencing at 6 A. M. of the 21st of December, 1836, and ending at 6 P. M. of the following day.

(*Lat.* 40°44′58″ *N.*, *Long.* 73°44′20″ *W.*)

By Prof. C. GILL.

Hour.	Barom. corrected.	Attach. Therm.	Ext. Therm.	Wet Bulb Therm.	Winds from.	Clouds to.	Strength of wind.	*Remarks.*
6 A. M.	29.647	55.00	53.00	....	S	N	very high	Dark clouds and rain.
7 ..	29.642	56.00	53.00	....	"	"	"	do do
8 ..	29.635	57.00	54.00	....	"	"	"	do do
9 ..	29.583	57.00	51.00	....	"	"	"	do do more.
10 ..	29.569	57.00	52.50	52.00	"	"	"	do do less.
11 ..	29.556	51.50	51.00	50.50	SSW	"	"	do do
12 ..	29.531	57.00	53.50	51.00	"	"	"	do mist and small rain.
1 P. M.	29.597	58.00	46.00	42.50	WNW	E	"	Dark, driving clouds.
2 ..	29.701	55.00	38.00	34.75	NW	SE	"	do
3 ..	29.731	49.00	36.00	31.50	"	NE	high	Fleecy white clouds.
4 ..	29.795	47.00	33.00	29.00	WNW	E	"	Thin white clouds.
5 ..	29.875	50.00	29.50	27.50	"	.....	"	Clear.
6 ..	29.937	54.00	27.25	25.50	"	.....	very high	do
7 ..	29.999	52.00	25.75	24.25	"	.....	"	do
8 ..	30.046	51 50	23.50	22.25	"	.....	"	do
9 ..	30.094	51.00	22.00	20.75	"	.....	"	do
10 ..	30.174	50.00	21.00	19.25	NW	SE	"	do —one or two white clouds.

11 ..	30.217	50.00	20.00	18.50	"	.....	"	do	
12 ..	30.290	50.00	17.50	16.50	"	SE	"	do	one or two fleecy white clouds.
1 A. M.	30.319	49.00	16.00	14.75	"	.....	"	do	
2 ..	30.353	49.00	15.00	13.75	"	.....	"	do	
3 ..	30.381	49.00	14.00	13.00	"	.....	"	do	
4 ..	30.423	51.00	13.50	12.50	"	.....	brisk	do	
5 ..	30.434	52.00	13.50	12.50	"	.....	"	do	
6 ..	30.457	51.00	12.75	12.00	"	.....	"	do	
7 ..	30.471	50.00	12.75	12.00	"	.....	"	do	
8 ..	30.537	47.00	14.00	12.25	"	.....	"	do	
9 ..	30.564	38.00	14.50	12.50	"	.....	"	do	
10 ..	30.570	38.00	17.00	14.50	NNW	.....	"	do	
11 ..	30.554	35.00	18.50	15.25	"	.....	"	do	
12 ..	30.538	35.00	20.00	17.00	"	.....	"	do	
1 P. M.	30.539	37.00	20.75	17.75	"	.....	"	do	
2 ..	30.539	36.00	21.00	18.25	"	.....	"	do	
3 ..	30.544	35.50	20.25	17.75	"	.....	gentle	do	
4 ..	30.549	35.00	18.50	16 50	"	.....	"	do	
5 ..	30.554	37.00	17.75	16.25	"	.....	"	do	
6 ..	30.573	39.00	16.50	15.25	"	.....	"	do	
					"				
Means	30.150	48.00	27.00	25.25	"			Correction for capillarity, .025.	

Height of barometer above low water mark of Flushing bay, 54 feet.
Storm began at 4½ A. M., 21st, and ended at 12½ P. M.—depth of rain .34 inches.

TABLE VII.

Extract from a Meteorological Journal kept in the city of New-York by WILLIAM C. REDFIELD.

DECEMBER, 1836.	Hour.	Thermometer.	Att. Thermom.	Barometer.	Winds.	Strength of winds.	Clouds from what direction.	Weather, Remarks, &c.
Monday 19, at 10 P.M.	10	27	69	30.80	SW	Moderate, ...	WSW	Clear.
Tuesday 20, ...	6	26	54	.67	WSW—NE	Light, ...	SW	Cloudy.
A. M.	10	29	66	.73	NE	do	WSW	do —Fair.
P. M.	2	35	67	.55	NE—ENE	do	WSW ——— S	Low sea scud. Fair. Cloudy.
	6	36	68	.45	E by N—E	do mod...	" — "	Fair.
	10	45	68	.29	ESE—SSE	Gale, ...	" — "	Rainy. Gale in the night.
Wednesday 21,.....	6	51	61	29.81	SSE—S	Strong, fresh,	SW ——— S	Rain.

	10	52	68	.79	S—WSW—NW	Gale, ...	SW / SSW SW	Rain. Cloudy. Rainy.*
	2	40	66	.88	W	Strong.....	SW / W	Fair.
	6	30	67	30.14	W	do	SW	Fair.
	10	24	67	.38	W	do	....	Fair.
Thursday 22, ...	6	17	50	.58	W	Fresh, ...	.....	Clear.
	10	17	59	.70	W	do	NW	Wind scud. Fair.
	2	20	65	.67	W	do	"	Fair.
	6	19	65	.72	W	do	"	Fair.

The barometer is the same as in June and September. SSE—S denotes that the wind during the first part of the four hours was from SSE, and during the latter part from the south. $\frac{SW}{S}$ denotes that the upper visible stratum of clouds moves from southwest, and the lower from south. The terms which I use to denote the strength of the wind are *faint*, *light*, *moderate*, *fresh*, *strong*, *gale*, *hard gale*, *heavy gale*, *hurricane*

As the period allotted for observations in the South African Circular, includes, on this occasion, a portion of an extensive inland storm of marked character and rapid development, I have prefixed so much of my journal as includes the whole barometrical development of this storm, beginning at 30.80 at 10 P. M. on the 19th, (which is the highest observation I have ever made,) and ending with 30.70 at 10 A. M. on the 22d. Mean depression one inch. Minimum at 11.45 on the 21st. It is respectfully suggested whether this course ought not to be generally pursued in like circumstances, as the principal defect in Sir J. F. W. Herschell's recommendation appears to be the shortness of the period of observation.

* The wind at New-York veered WSW, and after a few minutes to NW, at 12 M., with a hard squall ; immediately previous to which the barometer stood at 29.75

TABLE VIII.

Meteorological observations made at New-Haven, Connecticut, commmencing at 7 A. M. of 21st December, 1836, and ending 6 P. M. of the day following, by E. C. Herrick *and* J. D. Whelpley.

Hours of Observa'n.	Barometer.	Attach. Thermom Fahr.	Ext. Thermom Fahr.	Wind.	Face of sky, &c.	
6 A. M.						
7 ..	29.80	54.	53.	S. violent, ...	Driving rain.	
8 ..	29.85	55.	53.	SSW do	do	
9 ..	29.81	60.	52.	S do	do	
10 ..	29.76	63.	52.	S by E, moderate,..	Gentle rain.	
11 ..	29.68	63.5	52.	S do ..	No rain; clouds moving hurriedly and breaking up.	Occasional slight show. during this period.
12 ..	29.68	66.5	52.	S by W do ..	do overcast.	
1 P. M.	29.67	66.5	53.	do do ..	do do	
2 ..	29.72	65.5	43.	WNW, strong,.....	do do	
3 ..	29.80	65.5	40.	do gentle,.....	do do	
4 ..	29.83	64.5	39.	do do	Clouds broken. Sun visible.	
5 ..	29.90	63.	37.	do do	Flying clouds.	
6 ..	30.	64.	34.5	do do	Entirely overcast.	
7 ..	30.06	64.5	31.	do do	Nearly clear. Light fleecy clouds.	
8 ..	30.10	64.	30.	do do	Clouds breaking. A little snow between 7 and 8 P. M.	
9 ..	30.16	62.5	28.	do do	Clear in south.	
10 ..	30.23	61.	25.5	do fresh, ...	Overcast.	
11 ..	30.27	61.25	24.	do do	Clouds moving SE.	
12 ..	30.32	60.2	20.1	NW do	Clear.	

1 A. M.	30.37	59.5	19.	do moderate, ...	do
2 ..	30.43	58.	18.	do fresh, ...	do
3 ..	30.45	58.	18.	do do	do
4 ..	30.45	58.	16.	do do	do
5 ..	30.46	57.	16.	do gentle, ...	do
6 ..	30.53	56.	15.	do do	do
7 ..	30.55	55.	15.	WNW, fresh, ...	do
8 ..	30.57	55.	16.	do do	do
9 ..	30.59	55.	17.	do gentle, ...	do
10 ..	30.61	56.	19.	NW, fresh, ...	do
11 ..	30.61	56.5	18.	do do	do
12 ..	30.61	57.	19.	do do	do
1 P. M.	30.61	56.	20.	NNW do	do
2 ..	30.61	56.	20.5	do do	do
3 ..	30.61	55.5	19.5	N, do	do
4 ..	30.61	55.5	18.	N by W, fresh;	do
5 ..	30.64	54.5	16.5	N, fresh, ...	do
6 ..	30.65	55.5	16.	N, do	do

Western declination of magnetic needle, December, 1836. about 5° 55′. Instruments and position same as in Sept.

TABLE IX.

Meteorological observations made at Gardiner, Maine, for thirty-seven successive hours, commencing at 6 A. M. of the 21st of December, 1836, and ending 6 P. M. of the following day, winter solstice, lat. 44° 10′ N.

By R. H. Gardiner, Esq.

Hour.	Barom.	Att. Ther.	Ex. Ther.	Wet bulb Ther.	Wind.	Strength of wind.	Clouds.
21st. 6 A. M.	30.15	50	40½	*	SE	Gale, ...	Nimburs.
7 ..	30.13	54	40½	....	SE	do	do slight streaks of red at south.
8 ..	30.08	55	41½	....	SE	do	Rain.
9 ..	29.99	58	43½	....	SE	do	Nimburs. Gale increases.
10 ..	29.96	58	43½	....	SE	Severe gale, ...	Violent rain at ¼ before and continues.
11 ..	29.91	60	43½	....	SE	do	do
12 ..	29.81	60	44	....	SSE.....	do	do
1 P. M.	29.75	60	45	....	SSE.....	do	do
2 ..	29.67	60	47	....	S	do	Rain abated. $\frac{4}{5}$th of an inch of rain fell between 8
3 ..	29.66	60	47	....	S	do	Rain. [A. M. and 5 P. M.
4 ..	29.52	59	48½	....	S	do	Violent rain.
5 ..	29.50	61	49	....	S	do	do
6 ..	29.52	62	47	....	SW by W	Not quite so violent,	Cloudy.
7 ..	29.60	68	47	....	NW.....	Moderate, ...	Stratus.
8 ..	29.65	68	33	....	NW.....	Fresh, ...	Cir. St. Moon shining thro' large masses of clouds
9 ..	29.82	63	32	....	N	do	do do do [from WSW.
10 ..	29.88	61	27	....	NW.....	do	Cir. Almost clear clouds from WSW.
11 ..	29.94	61	22	26½	NW by N	do	Clear. do do
12 ..	29.99	60½	20½	19	N	do	Cum. st. do do

22d	1 A. M.	30.04	56	19	18	N	do	do do do
	2 ..	30.09	55	17	16	N	do	Clear, not a cloud to be seen.
	3 ..	30.14	54	16	15	N by W .	Very fresh, ...	do do
	4 ..	30.15	55	14½	14	N	do	do do
	5 ..	30.22	56	14	....	NNW ...	Fresh, ...	do do
	6 ..	30.25	60	13	...	NNW ...	Moderate, ...	do do
	7 ..	30.30	61	12	....	NW by N	Fresh, ...	do do
	8 ..	30.34	56	13½	....	do	Moderate, ...	do do
	9 ..	30.37	56	14	....	do	do	do do
	10 ..	30.40	58	18	....	do	do	A few cumuli from NW.
	11 ..	30.41	....	19	....	do	do	do do
	12 ..	30.42	55	19½	....	do	Fresh, ...	Cumuli all round the horizon, and cum. st. above
	1 P. M.	30.42	55	19	....	do	do	do do do [from N to S.
	2 ..	30.41	....	18	....	do	do	do do do do
	3 ..	30.43	....	17	....	do	do	do do do do
	4 ..	30.46	....	14½	....	do	do	do do do almost clear.
	5 ..	30.48	....	13	....	do	do	Clear.
	6 ..	30.50	....	10	....	do	do	do

The thermometer fell before morning of 23d to 3½.

The storm commenced on the 20th Nov. at 10 P. M., when it began to blow fresh, and rain commenced soon after midnight. Instruments and location same as in Sep. 1836.

* Both external thermometers wet with the rain.

TABLE X.

Meteorological Table for 1836, *kept at Augusta, Hancock county, Illinois, by* Samuel B. Mead, M. D. *and communicated by him.*

		January.	Feb.	March.	April.	May.	June.	July.	August.	Septem.	October.	Novem.	Decem.	An. Mean.
Temperature of 1st half month.	At sunrise,	32.06	16.40	21.86	41.26	57.73	61.46	64.80	65.80	57.00	41.86	37.80	25.73	
	2 P. M.,	43.86	32.66	39.60	58.60	77.33	78.13	82.40	79.13	74.06	63.86	59.40	38.06	
	½ hour after sunset,	40.80	29.13	35.20	54.86	69.60	70.00	74.26	73.33	66.46	53.06	50.33	28.46	
	Mean of 1st half month,	38.90	26.06	32.22	51.57	68.22	69.86	73.82	72.75	65.84	52.92	49.17	30.75	
Temperature of 2d half month.	At sunrise,	15.25	28.28	32.25	31.06	56.62	61.13	67.06	67.18	58.46	36.81	29.73	14.75	
	2 P. M ,	31.37	43.33	49.56	69.20	74.87	78.73	84.93	77.18	72.73	58.68	49.66	23.06	
	1½ hours after sunset,	27.62	38.71	45.87	63.53	68.25	71.26	76.75	69.93	67.33	49.68	42.46	19.00	
	Mean of 2d half month,	24.74	36.77	42.56	54.59	66.58	70.37	76.24	71.43	66.17	48.39	40.61	18.93	
	Mean of whole month,	31.82	31.41	37.39	53.08	67.40	70.11	75.03	71.59	66.00	50.65	44.89	24.84	52°01
Thermometer.	Lowest,	—4	—6	6	27	44	55	56	48	41	24	13	—19	
	Highest,	60	68	64	84	85	86	90	89	86	78	69	53	
	Monthly range,	64	74	58	57	41	31	34	41	45	54	56	72	
Days.	Fair,	16½	15½	16½	19½	23½	21	26	18	16½	23	16½	17½	
	Cloudy,	9½	8	9½	4½	5	4	2	7½	6	4½	7½	8	
	Rain,	4	2½	3	6	2½	5	3	5½	7½	3½	4½	2	
	Snow,	1	3	2	.....	.....	.....	.....	.....	.....	.....	1½	3½	

Crab Apple leaved out April 25. Thorn, Blackhaw and Elm leaved out April 28. The Forest Green, May 5. First frost, Oct. 4. First snow, Nov. 21.

From an examination of the Diary of the Weather at the U. S. Hospital, Garrison of Key-West, Florida, communicated by Lieut. ALVORD, U. S. A., *the following facts appear, viz:*

	1834.		1835.	
	Date.	Deg. Fahren.	Date.	Deg. Fahren.
The average temperature for every portion of the day throughout the whole year,	.....	76.24	.....	74.48
The average temperature at 2 o'clock P. M. throughout the year,	.....	77.95	.....	75.47
The average temperature at 2 o'clock P. M. for six warmest months, viz. April, May, June, July, August and September,	.....	82.02	.....	82.20
The average temperature at 2 o'clock P. M. in the warmest month in the year,	August, ...	84.97	July,.	84.71
Average temperature at 7 A. M. in the six coolest months in the year, viz. October, November, December, January, February and March,	.....	70.67	.....	68.87
The average temperature at 7 A. M. in the coolest month in the year,	December,	69.58	February, .	63.17
The thermometer at the highest degree at 2 o'clock P. M.,	9th August,	88.	19th July, .	87.
The thermometer lowest at 7 o'clock A. M.,	14th Dec.,	61.	9th Feb.,	52.

Synopsis of a Meteorological Journal kept in the city of New-York, during the years 1835 *and* 1836, *reported to the Albany Institute by William C. Redfield, corresponding member.*

The abstract of observations from my private journal now submitted to the Institute, is a continuation of those reported to the honorable Regents of the University, on the 22d of January, 1835.* The following tables exhibit the result of the observations on the direction of the surface winds, and also of the more elevated or main atmospheric current, as indicated by the highest observed movement in the region of clouds.

Abstract of observations for the year 1835.	Direction of the surface winds in periods of four hours.				Direction of the highest observed current in the region of clouds.			
	From NE. quarter including N.	From SE. quarter including E.	From SW. quarter including S.	From NW. quarter including W.	From NE. quarter including N.	From SE. quarter including E.	From SW. quarter including S.	From NW. quarter including W.
January, ...	52½	15	45½	39	1	0	90	12
February, ...	40	3½	48½	44	0	0	85	13
March, ...	44½	15	48½	41½	11	0	61	19
April, ...	27½	24	37½	45	10	0	49	43
May, ...	35½	22½	60	24	6	1	24	83½
June, ...	16	24½	67½	26½	0	0	31	67
July, ...	8	18½	87½	19	10	5	72	28
August, ...	18½	9½	75	35½	5½	4	76	26½
September, ...	20½	20½	63½	35½	3	8	65	19½
October, ...	29½	24½	75	13	1	0	79	13
November, ...	22½	12	60½	45	6	2	61	39
December, ...	31	3	50	66	0	0	54	60
Ann. results for 1835, .	346	192½	718½	434	53½	20	747	423½
Proportion in 1,000, ...	205	113	425	257	43	16	600	341

On examining these results it will appear that the prevailing wind or natural current of the atmosphere, is from the the south-west quarter, as I have shown on a former occasion; and this result is rendered more obvious by the fact that our south-westerly winds are of a more equable and current-like character than the gyratory and stormy winds which generally blow from other quarters of the horizon.

* Annual report of the Regents of the University of the State of New-York to the Legislature of the State, 1835. Silliman's Journal, vol xxviii, p. 154.

The total of easterly winds observed for the year, as appears from the above table, is 538. Total of westerly winds 1,152. The proportion of westerly winds in 1,000 is 682; or more than two to one.

The predominance of the westerly wind at the surface is, however, less striking than that of the upper current; the observations of which result as follows: easterly 73½, westerly 1,170. The proportion of westerly observations in 1,000 is 941; the prevailing current being from the south-western quarter.

Abstract of observations for the year 1836.	Direction of the surface winds in periods of four hours.				Direction of highest clouds in periods of four hours.			
	From NE. quarter including N.	From SE. quarter including E.	From SW. quarter including S.	From NW. quarter including W.	From NE. quarter including N.	From SE. quarter including E.	From SW. quarter including S.	From NW. quarter including W.
January,	55½	7	32½	51	8	0	61	23
February,	50	1½	25	61½	0	0	68	31
March,	26	27½	63	30	3	0	95	22
April,	22½	36½	42	36	4	0	55½	58½
May,	52	28	54½	13½	5	0	94	24½
June,	72	24½	31	10	37	6	66	15
July,	53	19	67	14	22	3	64½	24½
August,	28½	16½	59	35	6	0	36	14
September,	57	20½	47½	20	0	4	69	28½
October,	27	5½	66½	43½	4	0	56½	40
November,	24	16½	49	50	6	5½	52½	40½
December,	11	21	59	49½	0	0	88	36
Ann. results for 1836, .	478½	224	596	414½	95	18½	806	357½
Proportion in 1,000....	279	131	348	242	74½	14½	631	280

The total observations of easterly winds for the year 1836 are 692; total of westerly winds 1,010. The proportion of westerly winds in 1,000 is 590.

The total observations of upper westerly current are 1,163; do. easterly 113. Proportion of upper westerly current in 1,000, 911.

The year 1836 has been remarkably cold, the mean temperature being lower than in any other year since 1816. The year has also been to some extent, anomalous in the character of its winds; strong and regular winds from the eastward, with a high state of the barometer and cloudy weather, having frequently occurred during the summer.

The great predominance of the upper current from the westward would, however, be more apparent, were it not that the observed clouds which move from the eastward, usually belong to the

stratum of surface wind, and conceal the regular movement of the clouds which float at the same time in the upper current, and the only observed movement of clouds, is necessarily set down to the upper current, though actually pertaining to the surface wind.

Table of the monthly mean height of the barometer in English inches, for each of five daily observations during the year 1835.

1835.	6 A. M.	10 A. M.	2 P. M.	6 P. M.	10 P. M.	Monthly mean.
January, ...	30.152	30.175	30.161	30.140	30.176	30.161
February, ...	30.160	30.203	30.166	30.177	30.202	30.182
March, ...	30.122	30.162	30.121	30.127	30.175	30.141
April, ...	29.986	30.008	29.991	29.993	30.032	30.002
May, ...	30.064	30.086	30.056	30.044	30.071	30.064
June, ...	39.066	30.082	30.064	30.043	30.055	30.062
July, ...	30.123	30.132	30.089	30.097	30.112	30.111
August, ...	30.075	30.089	30.070	30.065	30.079	30.075
September, ...	30.141	30.158	30.125	30.114	30.147	30.131
October, ...	30.186	30.214	30.176	30.185	30.206	30.193
November, ...	30.133	30.148	30.112	30.122	30.133	30.129
December, ...	30.165	30.210	30.148	30.164	30.186	30.175
Annual results, ...	30.116	30.139	30.107	30.106	30.131	30.119

Table of the monthly mean height of the barometer for each of five daily observations during the year 1836.

1836.	6 A. M.	10 A. M.	2 P. M.	6 P. M.	10 P. M.	Monthly mean.
January, ...	30.148	30.166	30.140	30.154	30.170	30.156
February, ...	30.189	30.200	30.172	30.166	30.195	30.184
March, ...	30.184	30.218	30.191	30.183	30.199	30.195
April, ...	30.205	30.234	30.197	30.189	30.212	30.207
May, ...	30.107	30.139	30.102	30.082	30.110	30.108
June, ...	30.104	30.133	30.113	30.092	30.117	30.112
July, ...	30.065	30.081	30.060	30.048	30.063	30.063
August, ...	30.116	30.182	30.122	30.095	30.114	30.116
September, ...	30.157	30.180	30.154	30.129	30.163	30.157
October, ...	30.082	30.110	30.069	30.082	30.122	30.093
November, ...	30.088	30.123	30.079	30.087	30.112	30.098
December, ...	30.214	30.228	30.214	30.242	30.225	30.231
Annual results, ...	30.138	30.162	30.134	30.129	30.150	30.143

Table showing the monthly range of the barometer for the years 1835 *and* 1836.

	1835.			1836.		
	Monthly maximum	Monthly minimum	Range	Monthly maximum	Monthly minimum	Range
January,	30.68	29.40	1.28	30.68	29.48	1.20
February,	30.67	29.71	.96	30.78	29.55	1.23
March,	30.75	29.31	1.44	30.70	29.50	1.20
April,	30.41	29.19	1.22	30.67	29.73	.94
May,	30·52	29.74	.78	30.43	29.66	.77
June,	30.58	29.55	1.03	30.29	29.83	.46
July,	30.32	29.82	.50	30.39	29.68	.71
August,	30.29	29.80	.49	30.36	29.82	.54
September,	30.53	29.45	1.09	30.39	29.58	.81
October,	30.48	29.60	.88	30.50	29.50	1.00
November,	30.60	29.19	1.41	30.67	29.60	1.07
December,	30.67	29.70	.97	30.80	29.42	1.38
Annual results,	30.75	29.19	1.56	30.80	29.42	1.38

The mean of the barometrical observations for 1835 and 1836, as deduced from the above tables, is 30.131 inches.*

The barometer used in 1835 and the early part of 1836, was of the syphon construction, and no allowance has been made for capillarity or variation of level in the cistern. The calibre of the tube is estimated at .28 inches, and the relative areas of the cross sections of the tube and cistern as 1 to 30. The scale was adjusted by measurement with common boxwood instruments, and is deemed to be a little too high above the cistern, and consequently reading off a little too low. Since May, 1836, the observations were taken from a new barometer, constructed by Roach, under special directions, which has a glass cistern surrounding the bottom of the tube, with solid glass bottom which shows the level of the mercury in the cistern and the point of zero adjustment, and which is not subject to the variations in the adjustment which result from a flexible bottom of soft leather. The mercury was boiled in the tube, and the measurement was carefully made on the basis of a new twelve inch ivory scale of accurate workmanship, made by Elliott, of London, and which is presumed to be a copy of the English standard foot. An experiment was tried with an open syphon tube and cistern, in order to ascertain the true point for the zero level, including capillarity, in order to avoid the trouble of this correction. The instrument was graduated at a temperature of about 68° Fahrenheit, and the relative capacities

* The apparent discrepancy between the results of barometrical observations made in Indiana, and those which I have formerly reported, as noticed by Mr. Owen in Silliman's Journal, vol. xxix, p. 295, is fully accounted for by the different height of the two places of observation above the level of the sea.

of tube and cistern are as 1 to 40. The position of the cistern is probably within ten feet of the mean level of the tide in this harbor. To the extreme ranges by this instrument, as noted in the tables, should be added the variations of level in the cistern, which are as 1 in 40.

It is, however, to the special variations of the barometer during extraordinary phases of weather that we must look for the most interesting and important generalizations; and these cannot find place in such a summary of observations as is now presented. It is important to the cause of science that a series of barometrical observations should be made at certain hours, daily, at several points in the frontier counties and in the centre of the State, and preserved for collation in the repository of the Regents of the University. A few cases of interest, of which a partial knowledge has been obtained, may here be adduced by way of example.

The great storm of November 11th, 1835, which in its course from the interior of the continent, swept over the greater portion of the United States and Canada, if it possessed the general rotative character which is commonly exhibited by the storms of the sea-board, as most of its phenomena would seem to indicate, then its centre of rotation must have passed through the basin of the great lakes and of the St. Lawrence, and the physical influences of the rotative action must have here produced the greatest degree of depression in the barometer, and this effect must have become lessened towards the sea coast of the middle states. Unfortunately, we have no barometrical observations from the basin of the lakes; but at New-York the minimum of the barometer under this storm was 29.19 inches, and the direction and phases of the wind were such as to indicate the southern portion of the disk of the storm; while at Quebec the mercury fell to 28.09 inches, being the lowest known in a period of nine years. This remarkable storm progressed regularly in an easterly or northeasterly direction, and from the phases of the wind, it is inferred that its centre of rotation passed over Lake Ontario, and not greatly distant from Quebec. The induction from the geographical direction and changes of the wind, and from the observations of the barometer in this case, seem mutually to strengthen each other.

On the 3d of January, 1837, the barometer at Montreal fell to 28.77, under a heavy storm, which commenced the afternoon preceding. At Albany the barometer fell to 28.98 with a slight fall of snow. At New-York the barometer only fell to 29.37, wind at W and WSW. From all which it would appear that the centre of this storm must have traversed the basin of the St. Lawrence.

On the 21st of January, 1837, there occurred at New-York a severe gale from NE by E, with rain and snow, which veered by N during the night, to the north-westward on the 22d, having exhibited the usual phenomena of rotative storms. Under this storm the barometer fell to 28.80 at 10 P. M., which is the lowest observation which I have yet made in this city. At Albany the storm was also severe, and the barometer at 11 P. M. sunk to 28.94, the wind also veering, by N during the night, to NW on the

afternoon of the 22d.* From these data it would appear that this storm was of large extent, and that its centre of rotation passed on a line which lays to the seaward of the city of New-York.

As the series of barometrical observations above suggested, are not likely to be comprised in the reports of the several academies to the Regents for the current year, it is hoped that this deficiency will be supplied, in part, by voluntary reports from gentlemen in different parts of the State. Reports of like character, and also of winds, from some points in the Canadas, and in the western States, are also deemed a desideratum, and would, doubtless be thankfully acknowledged by the Institute.

New-York, February 25, 1837.

Abstract of a register of the barometer and hygrometer kept in the city of Albany during the year 1836, *by Matthew Henry Webster, Corresponding Secretary of the Albany Institute.*

A desire to contribute in some small degree to a knowledge of the atmospherical phenomena, exhibited in our city, induced me to commence with the past year a register of the barometer, thermometer, &c. which was continued with considerable regularity. The situation, however, in which I was obliged to expose my instruments, was so much affected by radiation from neighboring walls, which at the same time afforded an almost perfect shelter from northerly winds, as to render the results given by the external thermometer of little value: they have therefore been left out of this statement. But as these circumstances do not affect the dew point, the monthly mean of the morning and evening, and of both observations, the maxima, minima, range, and the degree of moisture on the hygrometric scale, in which 1,000 represents the term of saturation, are given in the following table.

Months.	9 A. M.	6 P. M.	Mean of observation	Max.	Min.	Range	Hyg. Scale.
January,.....	18° 82	17° 86	18° 34	34°	—3°	37°	756°
February,.....	11 25	13 27	12 26	36	—3	39	782
March, ...	16 25	18 21	17 23	37	0	37	640
April,.....	30 40	32 53	31 46	58	6	52	607
May, ...	45 77	48 06	46 46	66	23	43	585
June, ...	57 31	57 50	57 40	69	41	28	725
July, ...	64 06	64 22	64 14	77	48	29	702
August,.....	56 66	56 69	56 67	68	42	26	707
September,.....	54 43	55 22	54 82	70	34	36	794
October, ...	34 79	36 27	35 58	....	....	....	681
November,.....	30 12	32 29	31 20	....	....	....	762

* For these, and other valuable observations, the writer is indebted to Mathew Henry Webster, Esq., corresponding secretary of the Albany Institute.

These observations were made in January and February, with one of Daniell's hygrometers, which was only graduated to 3°, and thus for many successive days the temperature of the dew point being below that point, the results above given are too high. During the other months a capsule hygrometer, on the plan of Pouillet, was employed. This agreed well with Daniell's on comparison, and seems to me a preferable instrument, as being less liable to be broken and requiring less ether. Having unfortunately been broken in December, enough observations were not made in that month to warrant the calculation of means. But on several occasions deposition was obtained at —10°, which was the lowest point of the instrument.

The barometer used is of the ordinary construction, with a leathern bottomed cistern, in which, however the adjustment for zero is made previously to each observation, by a delicate ivory float, resting upon the surface of the mercury of the cistern, which is thus open to the air; the 30 inches were measured from the standard scale in the office of the Secretary of State. By an intermediate comparison with that employed by Mr. Redfield, of N. York, it requires a correction of –.04 of an inch. The tube is well filled, and exhibits the electric light in the vacuum chamber, is .16 inches in diameter, and the constant correction of .044 is added for capillarity. The attached thermometer is on the metal scale, and the table given in Daniell's meteorological essays has been followed in reducing the observations to the temperature of 32°. The elevation of the cistern above low water mark of the Hudson river, is 64 feet. The following table shows the monthly means in the morning and evening, the mean of the observations, the maxima and minima and range.

1836.	9 A. M.	6 P. M.	Mean.	Maximum	Minimum	Range.
January,	30.274	30.242	30.258	30.828	29.696	1.132
February,	30.242	30.204	30.223	30.700	29.630	1.070
March,	30.160	30.106	30.133	30.590	29.540	1.050
April,	30.169	30.097	30.133	30.620	29.660	0.960
May,	30.082	29.995	30.042	30.435	29.625	0.810
June,	30.102	30.047	30.068	30.320	29.840	0.480
July,	30.006	29.946	29.992	30.400	29.610	0.790
August,	30.079	30.021	30.054	30.340	29.790	0.550
September,	30.101	30.048	30.074	30.425	29.490	0.935
October,	30.062	29.992	30.077	30.463	29.420	1.043
November,	30.006	29.995	30.000	30.548	29.444	1.104
December,	30.178	30.159	30.168	30.690	29.200	1.490
Means,	30.1217	30.071	30.1018	30.828	29.200	1.628

The barometer is exposed on the exterior of the house, under cover of a wooden shed.

METEOROLOGICAL REGISTER FOR 1836,

Kept at Montreal, Lower Canada, in Lat. 45° 30′ N. Long. 73° 22′ W. by J. S. M'Cord, *Corresponding Secretary Natural History Society.*

	Barometer.	Thermometer.	WIND. Number of days blowing.								WEATHER. Number of days of each.						Rain gage.	Snow gage, unmelted.‖	Temperature of the bottom of well at Guilbault's Bot. Garden, 31 ft. deep
			N.	NE.	E.	SE.	S.	SW.	W.	NW.	Cr.	Cy.	Rn.	Shrs.	Fog.	Sn.			
Jan. ..	29.946	17.05	7.00	4.50	0.50	....	3.00	3.50	7.50	5.00	10.00	13.25	0.50	....	....	7.25	....	18.20	43
Feb...	29.965	11.32	5.50	1.00	....	....	1.50	6.50	9.50	5.00	12.25	10.75	1.75	*1.75	0.25	2.25	....	19.35	43
Mar. .	29.907	20.90	5.00	1.34	....	1.16	6.50	7.84	7.66	1.50	14.25	12.50	1.00	....	....	3.25	....	14.40	41
April,	29.959	35.24	8.33	3.34	0.84	0.33	5.83	4.50	2.50	4.33	17.25	7.50	1.75	0.25	†0.25	3.00	0.50	8.45	41
May, .	29.870	53.32	9.34	1.50	1.58	0.50	0.83	4.50	4.75	1.00	9.50	8.75	5.00	0.75	‡....	....	3.70	0.50	41.5
June, .	29.934	65.25	4.00	4.00	4.00	3.50	8.00	3.00	2:50	1.00	14.75	9.50	2.50	2.75	0.50	....	1.25	....	45
July, .	29.859	71.90	7.84	1.50	1.00	....	4.50	9.33	4.50	2.33	19.50	7.00	2.25	2.25	....	....	2.70	....	50
Aug. .	29.872	63.05	4.00	0.50	2.00	0.50	6.00	7.00	5.50	3.50	14.75	8.25	4.50	1.50	§....	....	2.95	....	53
Sep...	29.917	57.46	5.84	1.33	1.50	1.83	4.50	6.50	6.00	2.50	15.75	9.00	4.25	.75	....	0.25	2.05	....	52.5
Oct. ..	29.989	39.37	1.00	3.00	....	.50	4.50	8.00	10.50	3.50	10.50	14.25	4.25	....	....	2.00	3.55	....	51.5
Nov. .	29.869	32.24	5.50	....	1.00	.50	4.50	5.00	8.50	5.00	6.75	18.25	3.00	....	....	2.00	2.50	5.15	46
Dec. .	29.956	18.09	2.50	3.00	....	....	6.00	7.00	9 50	3.00	6.25	15.75	3.25	....	....	5.75	....	11.60	43
	29.920	40.43															19.20	77.65	45.87

* Drifting. † Hail. ‡ Only 24 days of this n onth were recorded. § Only 29 days of this month were recorded. ‖ The snow gage is kept at Long-Point, five miles from Montreal, by W. Belin, Esq. M. D.

Mean Pressure of the year corrected and reduced to 32° Fahrenheit, ...	29.920
Mean Temperature of the year, being the mean of the maxima and minima taken by register thermometers,..	40.43
Maximum height of the barometer during the year, (24th December, 9 P. M.)	30.550
Minimum, (14th December, 9 A. M.).....	29.000
Range of barometer,.....	1.550

Warmest day, (9th July,).. 90° (mean of the 24 hours, 79.75)
Coldest day, (2d February,)–19

Range of thermometer, .. 109				
Number of days of westerly winds,.....			.....	189.24
do	easterly	do	.....	46 25
do	north	do	.....	65.85
do	south	do	.....	55.66
Number of days observed,.....			.....	357.00

N. B. The instruments used are all of the first description. The barometer, a standard mountain, by Newman. The register thermometers by the same, and compared with a standard by Adie & Son, Edinburgh. The rain gage by Newman, after the one used by the Royal Society, London. Every precaution is used in the placing of the instruments, which a residence in a city will admit of.

Eight years state of the atmosphere, on Cape Diamond, Quebec, taken at three hour intervals by* J. WATT, *Superintendent of Telegraphs in Canada, N. A.*

YEAR.	BAROMETER.			THERMOMETER, (Fahrenheit's.)		
	Highest.	Lowest.	Mean or average Inches.	Highest.	Lowest.	Mean or average.
1829.	30.63 4 December,	28.15	29.38	91° May 25th.	—33° below zero, January 4th.	39°
1830.	30.32 7 February.	28.00 8 March.	29.50	94° July 21st.	do January 31st.	41°
1831.	30.42 14 February.	27.54 9 April.	29.35	92° July 8th.	—22° below zero, January 21st.	39°
1832.	30.41 16 February.	27.92 18 December.	29.435	85° July 18th.	—25° below zero, February 24th.	35.50
1833.	30.35 7 December.	28.41 15 November.	29.38	86½° June 23d.	—30° below zero, January 19th.	36.91
1834.	30.82 29 November.	28.40 15 February.	29.675	93° July 9th.	—24° below zero, December 15th.	36.88

* Except at midnight and 3 o'clock.

YEAR.	BAROMETER.			THERMOMETER, (Fahrenheit's.)		
	Highest.	Lowest.	Mean or average Inches.	Highest.	Lowest.	Average or mean.
1835.	30.95 25 March.	28.09 12 November.	29.80	88½° August 13th.	—30° below zero, February 4th.	33.41
1836.	30.85 15 May.	28.35 11 March.	29.822	92° July 9th.	—26° below zero, Feb. 2d, and Dec. 31.	35.83
The mean,	30.59	28.11	29.543	90¼°	—28° below.	37.19

The monthly means are taken from the average of the daily means.
The yearly means are taken from the average of the (12) monthly means.

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Annual means and extremes of the barometer and thermometer, from observations made by G. A. VANDERVOORT, *at Amsterdam, in Holland, Lat.* 52° 22′ *N. Long.* 4° 53′ *E.*.

Years.	BAROMETER.			THERMOMETER.		
	Mean.	Max.	Min.	Mean.	Max.	Min.
1830,	755.	771.	733.	49.1	86.5	1.
1831,	755.2	771.5	733.5	52.6	82.0	16.
1832,	758.	775.	739.	50.0	78.5	23.
1833,	758.	779.	729.	51.4	82.0	17.
1834,	761.5	777.	735.	53.6	84.0	27.
1835,	759.7	780.	728.	50.0	85.5	18.

The height of the barometer is given in Millimetres—the mean of the 6 years reduced to English inches, is 29.838. The thermometer is graduated to the Fahrenheit, scale, and the mean of the 6 years is 51°06. Humbolt gives the mean temperature 51°62 from 5 years observations of Mohr & Van Swinden.

ART. XI. *Table of Mean Temperatures, &c. deduced from the Reports of the Regents of the University.*—By MATTHEW HENRY WEBSTER.

In the following table the first column contains the names of the different academies at which the observations were made, arranged according to their respective latitudes, beginning with the north; the 2d and 3d contain the latitudes and longitudes as given in the reports, and when these were deficient I have supplied them from the county maps in Burr's atlas. The 4th column gives the elevation above the supposed mean level of the tide; these were also taken from the reports, and the deficiencies I have supplied from the best authorities to which I could refer. The next twelve columns contains the mean temperature of each month. The 17th column contains the mean temperature of each place, as deduced from the means of the months. The 18th column contains the mean temperature corrected for the error arising from the hours at which the observations were made, which is according to the Leith hourly observations +.75, to the Plymouth hourly observations +.77; the correction applied is the mean or .76, which has been subtracted. The last column shows the number of years for which observations have been made, and also the names of the years; the letter p, before a number, means that observations were only made during a part of that year, and the letter o, that no observations were made in the year before which it is placed.

Comparative view of the average or mean temperature of each month for the last ten years, prepared from the published reports of the Regents of the University of the State of New-York.

ACADEMIES.	Lat.	Lon.	El. ab'ye tide.	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Mean	Mean temp. corr'd.	No. of years.
St. Lawrence,	44°40	75°01	394	17.83	18.56	29.74	43.41	55.06	63.29	67.46	65.55	56.89	46.34	34.51	21.38	43.33	43.90	8. '28-35.
Gouverneur, H. S.	44 25	75 35	400	18.73	19.17	31.83	45.52	56.22	63.06	67.82	64.74	57.59	47.50	36.10	18.50	43.90	44.47	5. '31-35.
Lowville,	43 47	75 33	800	19.37	21.04	30.95	45.26	55.87	63.53	68.27	65.82	56.82	47.17	34.76	23.64	44.37	46.27	9. '27-35.
Union,	43 45	76 10	250?	22.84	23.42	34.03	48.71	55.01	62.92	68.72	64.47	57.90	48.85	38.50	22.72	45.67	45.73	5. '30-35. o. '32.
Granville,	43 23	73 16	....	19.80	20.94	30.53	41.76	55.36	65.72	70.33	66.98	57.64	47.13	35.86	17.47	44.12	*43.36	1. '35. p. '34.
Lewiston,	43 09	79 10	280	27.62	26.24	37.41	47.95	59.22	66.88	72.35	71.05	62.45	53.03	39.90	27.24	49.27	49.43	5. '31-35.
Rochester, H. S.	43 08	77 51	506	25.44	25.65	35.98	49.65	57.90	66.79	71.62	69.05	60.74	50.47	39.97	28.47	48.47	49.37	6. '30-35.
Washington,	43 08	73 17	....	23.81	22.95	33.38	44.43	55.62	66.03	68.60	67.24	56.60	45.72	39.66	32.63	46.39	*45.63	3. '28-30.
Oneida Institute,	43 07	75 14	425?	20.42	24.60	29.53	44.51	54.67	63.58	69.94	65.51	56.07	48.79	35.60	25.37	44.88	45.53	2. '34-35.
Utica,	43 06	75 13	473	22.66	24.20	33.50	45.36	57.49	64.76	67.74	65.76	57.40	48.72	36.24	26.94	45.90	46.72	10. '26-35.
Monroe,	43 06	77 39	600	27.76	20.61	32.60	44.54	59.18	64.82	67.20	65 20	55.30	54.72	39.00	27.84	46.56	47.80	1. '35.
Palmyra, .H. S.	43 05	77 16	450	25.21	28.29	32.35	46.25	57.64	64.08	70.67	66.44	57.68	51.78	39.82	26.71	47.24	47.98	1. '35. p. 34.
Fairfield,	43 05	74 55	1185	19.64	19.51	32.18	45.02	55.63	64.02	66.36	65.49	58.66	50.53	37.68	23.59	41.85	48.03	8. '27-35. o. 34.
Cambridge,	43 01	73 23	....	22.45	23.07	33.54	45.59	56.92	64.61	69.34	66.71	58.18	48.41	37.79	27.09	46.14	*45.38	9. '27-35.
Johnstown,	43 00	74 23	....	20.55	23.93	33.63	45.44	56.70	66.31	69.06	67.72	57.31	48.88	36.88	26.57	46.07	*45.31	6. '28, 9, 31, 2, 4, 5. p. '27, 30.
Onondaga,	42 59	76 06	....	25.44	26.67	35.83	47.48	61.12	67.70	69.82	70.11	60.47	50.96	37.92	30.87	48.69	*47.93	7. '26-35. o. '30, 1, 4.
Pompey,	42 56	76 05	1300	20.80	22.60	31.40	42.35	54.60	62.86	67.08	65.24	55.46	46.37	33.86	24.53	43.93	47.50	9. '26-35. p. '34.
Auburn,	42 55	76 28	650	24.71	26.41	34.32	47.66	57.53	65.36	69.60	67.20	58.70	50.61	39.23	31.84	47.76	49.16	3. '27-35. o. '32.
Bridgewater,	42 55	75 17	1286	22.44	22.45	30.16	43.12	53.01	58.32	67.58	62.59	54.92	44.67	28.90	22.95	42.59	46.11	3. '33-35.
Seminary Oneida Conference,	42 55	75 51	1100	21.09	21.17	31.81	45.02	54.51	61.85	67.29	64.14	56.76	47.97	36.29	23.59	44.29	47.09	6. '30-35.
Buffalo,	42 53	78 58	605	23·40	21.13	35.48	40.70	55.28	67.44	71.54	69.99	59.89	48.75	37.21	22.85	46.13	47.37	2. '31-32.
Canajoharie,	42 53	74 35	284	20.17	22.33	31.44	47.28	58.33	63.78	71.05	68.63	59.53	48.02	37.29	24.72	46.04	46.22	4. '30-35.
Canandaigua,	42 50	77 15	668?	24.19	23.81	33.38	46.38	57.11	66.16	70.81	68.96	57.81	49.28	36.44	28.31	46.88	48.34	7. '29-35. p. '28.
Hamilton,	42 49	75 34	1127	21.96	24.37	32.72	46.01	55.43	63.80	67.21	65.40	56.84	47.54	35.33	26.26	45.23	47.88	8. '27-35. o. '32.
Middlebury,	42 49	78 10	800	25.76	27.03	35.45	46.08	56.72	64.78	68.87	66.77	59.01	50.76	39.30	30.52	47.59	49.49	10. '26-35.
Schenectady,	42 48	73 55	226?	23.02	26.67	32.84	45.87	59.80	66.76	70.15	69.52	59.25	50.17	39.13	29.22	47.69	47.67	3. '29, 34, 5. p. '28.
Cherry-Valley,	42 48	74 47	1335	23.13	22.76	31.43	44.16	53.96	64.02	68.01	65.70	53.95	47.34	35.12	26.32	44.57	48.25	9. '27-35.
Lansingburgh,	42 47	73 43	30	23.37	25.74	35.58	48.20	59.77	68.45	71.74	69.72	61.62	51.06	39.15	28.05	48.54	47.88	10. '26-35.
Cayuga,	42 45	76 40	419	25.60	27.10	37.98	46.32	54.94	65.35	70.77	68.59	61.74	52.58	42.04	29.36	48.52	49.13	4. '30-34.
Albany,	42 39	73 44	130	24.17	26.11	36.43	48.93	61.21	68.36	72.08	70.06	61.32	50.64	39.25	28.78	48.94	48.61	10. '26-35.
Cortland,	42 38	76 11	1096	24.28	19.93	30.32	42.96	56.46	62.94	67.38	64.78	55.44	48.69	36.30	29.07	44.87	47.77	3. '32-35. p. '29-30.
Hartwick,	42 37	75 04	1100	22.70	24.43	33.82	43.43	56.22	64.46	67.05	65.94	58.27	48.46	37.11	27.07	45.74	48.64	8. '26-35. o. '33-4.
Springville,	42 31	78 50	1041	24.61	27.89	36.42	46.21	56.65	64.60	72.58	66.49	62.44	46.39	38.93	26.28	47.45	50.19	1. '34. p. '35.
Franklin,	42 30	77 13	1494	19.56	18.45	33.08	45.84	55.04	65.37	68.98	65.84	56.08	48.60	38.43	25.52	45.06	49.30	2. '29-30. p.'31.

Oxford,	42	28	75	32	961	21.51	22.37	32.99	45.72	56.49	63.33	67.42	65.85	57.06	47.69	36.74	26.04	45.26	47.70	6. '29-35. p. '32.
Ithaca,	42	27	76	30	417	27.76	29.33	35.96	48.26	59.21	66.13	71.11	69.14	59.81	50.72	39.40	32.47	49.10	49.39	5. '27, 8, 30, 3, 5. p. '29, 34.
Greenville,	42	25	74	00	....	25.46	27.29	34.43	43.12	60.66	67.93	69.87	70.82	61.73	50.03	36.65	32.00	46.67	*45.91	1. '26. p. '27, 8, 9.
Fredonia,	42	25	79	24	645	26.14	26.51	37.89	46.68	56.82	66.25	73.35	68.65	60.43	53.03	41.97	28.74	48.87	50.27	5. '30-35. o. '33.
Kinderhook,	42	22	73	43	125	22.10	23.32	34.97	47.49	57.15	64.89	70.04	67.83	59.21	49.14	38.92	24.24	46.60	46.25	6. '30-35.
Delaware,	42	16	74	58	1384	24.27	24.24	32.42	42.20	54.21	62.68	66.98	67.26	56.66	47.21	38.81	30.90	45.65	50.49	2. '28-30. p. '29.
Hudson,	42	15	73	45	150	24.31	26.15	36.54	48.91	60.12	68.28	71.84	70.58	61.89	52.53	39.61	28.87	49.13	48.87	9. '27-35.
Redhook,	42	02	73	56	....	25.50	24.56	35.37	48.86	56.87	66.16	70.85	68.23	60.21	50.74	41.19	26.44	47.91	*47.15	6. '30-35.
Kingston,	41	55	74	02	188	26.33	26.82	37.48	51.17	60.75	68.40	73.21	70.94	62.83	52.92	41.22	29.99	50.17	50.01	7. '29-35.
Dutchess,	41	41	74	45	150?	25.80	29.08	38.95	51.59	60.79	69.88	74.31	72.98	63.49	53.92	42.31	31.15	51.18	50.92	7. '29-35. p. '28.
Montgomery,	41	32	74	00	....	26.56	27.74	37.80	49.26	59.49	66.36	72.39	71.43	63.12	52.42	40.85	30.85	49.85	*49.09	8. '28-35.
Newburgh,	41	30	74	05	150	27.64	28.49	37.37	49.44	59.44	66.74	71.77	69.99	61.73	53.19	40.46	32.24	49.87	49.61	7. '28-35. o. 31.
Farmers' Hall,	41	20	74	11	425	23.12	28.81	35.15	44.58	56.71	63.50	70.94	65.39	57.23	50.05	37.90	25.33	46.55	47.20	2. '34-35.
North-Salem,	41	20	73	37	170	26.03	25.88	36.75	48.21	58.29	66.01	72.19	69.58	60.29	51.46	39.92	29.13	48.64	48.44	7. '29-35.
Mount-Pleasant,	41	09	73	47	125	26.26	28.81	38.62	47.52	57.83	67.56	69.12	70.47	61.85	51.99	42.23	28.86	49.25	48.90	4. '31-35.
Clinton,	41	00	70	19	16	29.77	31.21	36.69	44.80	53.28	62.94	68.65	68.41	61.78	53.33	43.82	33.97	49.05	48.34	9. '27-35.
Oysterbay,	40	50	73	49	....	29.79	32.60	39.18	51.38	58.05	67.48	74.24	70.67	63.04	52.98	43.58	33.66	51.38	*50.62	1. '34. p. '35.
Union-Hall,	40	41	73	56	....	29.71	30.91	38.56	47.83	57.98	66.24	71.01	70.34	61.73	52.79	42.02	33.32	50.20	*49.44	10. '26-35.
Erasmus Hall,	40	37	73	58	40	31.20	32.65	39.97	48.76	59.78	67.61	72.39	71.34	63.75	53.80	44.64	35.46	51.78	51.15	10. '26-35.

In the column of elevations, those marked with an interrogation point, are probable elevations, which have been inserted in order to complete the calculations. In the column of corrected mean temperatures, the asterisk indicates that the correction for elevation has not been applied.

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Art. XI. Annual Address, *delivered before the Institute, April* 27, 1837, *by* Matthew Henry Webster, A.M.

Gentlemen:

There is a peculiarity in the formation and constitution of the Institute, which while it presents, in my opinion, great and prominent advantages, at the same time occasions some embarrassment in the selection of a suitable topic for the present occasion. Our roll of members exhibits the names of individuals drawn from almost every class of society, occupied in all the diversified pursuits that hold out the prospect of wealth and reputation to their followers, and that reflect back upon the community at large the benefits arising from well directed labor. We find no exclusive cultivators of any particular branch of science, and hardly one whose whole attention is devoted to its study. It is made up in fact of a few who, though deeply convinced that much good might result from an association of themselves for scientific and literary purposes, have yet so many other and higher claims upon their time and attention, as to be compelled to make these subjects the amusement of their leisure, instead of the serious occupation of their lives. All of us possess a greater or less acquaintance with the grand outlines of the sciences; few, if any, can boast a profound knowledge of any of its departments.

The same peculiarity is observable in our constitution, the cultivation of science and literature generally, is its avowed object. Not any particular class of the sciences, in exclusion of the rest, nor yet any individual of a class, but the whole in their widest range. Our plan of operations does not restrict us to a narrow strip or portion of the domain of intellect, but embraces its whole extent. It is this magnitude of plan which gives to the Institute its distinctive character, and which has necessarily resulted from our social position. That minute division of labor both in science and art which is every where seen in thickly peopled communities, is hardly known among

us. In our larger cities some approach to it may be found, but the immense extent of country we possess not yet reclaimed from a state of nature, removes to a distance scarcely within the limits of calculation, the period when over-population shall be a theme of complaint to our statesmen and economists. And until that time shall arrive, we can scarcely expect that the principle of the division of labor will reach its full development. To me this seems a matter of congratulation; for although it may be strictly true that in the mechanic arts, high degrees of perfection can only be obtained by exclusive attention to a limited department, yet it may well be questioned whether, if the lowest price at which this perfection can be obtained, be, as it is and must be the comparative destruction of the human intellect by reducing its possessor almost to the level of the machine he directs, it is not too dearly bought. With us, however, such a state of things is as yet far remote, and we are at liberty to enjoy the more agreeable task of speculating about its results, instead of being compelled to occupy ourselves in devising plans for the modification or removal of its inevitable consequences.

And as in the mechanic arts, so in a limited degree is it true in the fine arts and the sciences, but only in a limited degree. The mind of man is of a finer and more flexible character, than his physical organs, and while an entire and complete devotion to a single branch of these higher pursuits, if it were possible, would injure and weaken the instrument, in the exact proportion in which it should be thus confined, it would not tend to produce the greatest perfection. There is a close and intimate union of the different departments here which does not exist in those of an inferior rank, and which requires in him who aspires to eminence in any of its divisions, a greater or less acquaintance with the whole. Improvement and perfection here, depend not upon manual skill and dexterity, but on the cultivation of the intellect. And he will be most likely to be successful in enlarging the boundaries of science, who possesses intellectual powers capable of taking the most extensive range, and which are least fettered by the empirical rules of the mere artisan. The argument from analogy then

is not strictly applicable to science, and only becomes so as we recede from those which are purely intellectual, and approach those arts which depend almost entirely upon physical skill.

To select an instance, with which my pursuits have made me familiar—the profession of the Law; we find that in England it is composed of the attorney, the solicitor, the conveyancer, the special pleader, and the barrister, exclusive of extensive classes whose studies and practice are confined to the courts of civil law. Each of these is a distinct profession, separated by almost insuperable barriers, and the evils frequently arising from the ignorance of even eminent individuals, in all but one peculiar branch, are great and notorious.* Here, on the contrary, instead of this grave array, we have the lawyer, practising in all the courts, and discharging alternately, and often in the course of the same day, the appropriate duties of these different branches. He may not, perhaps, be as deeply skilled in chicanery and trick as is the English attorney, nor possess the same minute and accurate acquaintance with the laws respecting the transmission of property as the conveyancer, nor have acquired the classical learning and polished elo-

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* Chitty, in his late work on Practice, says: "Recently a *common law Barrister*, very eminent for his legal attainments, sound opinions and great practice, advised that there was *no remedy whatever* against a married woman who, having a considerable separate estate, had joined with her husband in a promissory note for £2,500, for a debt of her husband, because he was of opinion that the contract of a married woman is absolutely void, and referred to a decision to that effect, he not knowing, or forgetting, that in *equity*, under such circumstances, payment might have been enforced out of the separate estate. And afterwards a very eminent *equity* counsel, equally erroneously advised, in the same case, that the remedy was *only in equity*, although it appeared upon the face of the case, *as then stated*, that after the death of her husband, the wife had *promised* to pay, in consideration of forbearance, and upon which promise she might have been *arrested* and *sued at law*. If the common law counsel had properly advised proceedings in equity, or if the equity counsel had advised proceedings by arrest *at law*, upon the promise after the death of the husband, the whole debt would have been paid. But, upon this latter opinion, a bill in Chancery was filed, and so much time elapsed before decree, that a great part of the property was dissipated, and the wife escaped with the residue into France, and the creditor thus wholly *lost his debt*, which would have been recovered if the proper proceedings had been adopted in the first or even second instance. This is one of the *very numerous* cases almost daily occurring, illustrative of the consequences of the want of at least a *general* knowledge of *every* branch of law."—2*d General Practice*, 303, *note* (*g*.)

quence of the barrister, but what is far better, his intellectual powers have been enlarged and strengthened by a more comprehensive course of study and discipline; and he is prepared not merely to discharge his duty toward his clients, but if occasion arise, to assume any of the numerous public stations which our institutions require, and to perform its functions with credit to himself and advantage to the commonwealth. The experience of every day furnishes additional proof of the truth of these remarks; and were we to cross the ocean, we should find that the most distinguished professional men even there, were those whose acquirements were most extensive, and whose studies had been the most varied.

The different professions, the sciences and the fine arts would furnish similar illustrations: what has been said of one, might with equal truth be said of all. But whatever difference of opinion may exist as to the consequences or advantages of such a state, there can be none as to the fact, that however the case may be elsewhere, here we hardly know of division of labor, except in name. And what I consider the necessary consequence is every where apparent: there are scarcely any whose depth and accuracy of knowledge is so great as to be remarkable, but at the same time there is none of that entire and almost brutal ignorance, which is by all admitted to prevail so extensively over the greater portion of Europe. The genial stream of knowledge is not here collected into wells and reservoirs of limited extent and unfrequent occurrence, but of unfathomable depth, but is spread over the whole country in kindly rills, of depth sufficient to prevent their entire evaporation, and carrying every where nutriment and health.

In such a situation of society, it was absolutely necessary, in attempting to found an institution for scientific purposes, to give to it a plan and object of great, one might almost say unlimited extent, in order thereby to ensure the union of a number of individuals sufficient for its existence and continuance. Experience also, in our case, added her warning voice, and the union of two societies has shewn, that far more has been accomplished by them jointly, than could, under the most favorable circumstances, have been expected from their divided efforts.

An address to such a society, if confined to the discussion of questions arising under any individual department of science, however interesting to the speaker or a portion of his audience, could hardly be expected to fix the attention of the majority, or result in any definite good. It has, however, occurred to me, that I might profitably occupy the present occasion, with considering how we may individually best discharge our duty as members of the Institute. In doing this, even should I not advance any positions having the recommendation of novelty, I feel that I may at least claim the merit of having attempted, at a humble distance, to follow the example of the distinguished individuals who have heretofore addressed you on similar occasions, in striving to give a practical character to what would else be a mere unmeaning display.

In becoming members of the Institute, the only positive engagement we make, is to contribute annually the sum of two dollars towards its funds; but I take it for granted that no one supposes that when he has done this, he has discharged all that can reasonably be expected from him. If such were the fact, and the like opinion should be entertained by all, it requires very little of the spirit of prophecy to predict with certainty what would be the condition of our Society. Instead of a library orderly arranged in suitable cases, we should either have none at all, or else a confused heap of books, from which any particular volume could only be selected after a long and tiresome search. Our museum would not exist, or the specimens composing it would remain packed up in the boxes in which they were sent to us, or scattered about our rooms, without being labelled or catalogued, useless for the purposes of study or examination, and forming an unsightly nuisance. Our treasury to be sure would be replenished; but the mere accumulation of money would not satisfy the ends of our incorporation, and might violate some of its provisions. That we have a library, which though small is yet of inestimable value for the purposes of the Society, and which, for its extent, need shun no comparison with that of any similar institution: that it is orderly arranged, and that catalogues of it have been made with great care and labor: that we have a museum

containing nearly all the minerals, rocks, and animals of the State, together with many others from different parts of our country and the globe, and which adds an ornament to this splendid hall, is entirely owing to the conviction of some of our members, that they would be guilty of a neglect of duty, if they should remain content with merely paying their annual contributions. Such a conviction should be entertained by each of our members; and until this is generally the case, the Institute will never be productive of all the benefit which has been hoped and expected from it. Not that I desire or believe it possible for each individual member to devote an equal portion of time to the welfare of the Society; such can never be the case; but it may reasonably be hoped, that each of its members should be constantly influenced by a desire to increase its usefulness; and this desire will be the means of producing results that, if now foretold, would be deemed wholly impossible. Some few of the different modes in which such a feeling could be profitably employed, I shall proceed to point out; and if I can satisfy you that no great demands are to be made upon your time, and that instead of being irksome and unpleasant, they may become highly delightful and useful to you, no matter what may be your pursuit or profession, I trust that some among you will be induced to attempt them in practice.

Among the first, I should place that of striving to increase the number of our members; of enlisting new recruits in the cause of science and literature, to supply the places of those whom we are gradually losing. The subjects for the cultivation of which we have associated together, can never be confined to a few without injury; without proportionably destroying the beneficial effects which they are calculated to produce. They are in their nature essentially expansive, and derive the greatest portion, if not all their value, from their general diffusion, and the new views and corrections that necessarily arise from the collision of different minds engaged in the examination of the same subject. Of the arts, as consisting of the practical application of knowledge, one of the most distinguished philosophers of the day has said: "They cannot be per-

fected till their whole processes are laid open, and their language simplified and rendered universally intelligible. If the knowledge be merely accumulated experience, the art is *empirical;* but if it be experience reasoned upon and brought under general principles, it assumes a higher character, and becomes a *scientific art.* The whole tendency of empirical art, is to bury itself in technicalities and to place its pride in particular short cuts and mysteries, known only to adepts: to surprise and astonish by results, but conceal processes. The character of science is the direct contrary. It delights to lay itself open to inquiry; and is not satisfied with its conclusions till it can make the road to them broad and beaten: and in its applications it preserves the same character: its whole aim being to strip away all technical mystery; to illuminate every dark recess, and to gain free access to all processes, with a view to improve them on rational principles." In increasing the number of our members, then, we are not merely acting for the benefit of this Society, however dear may be its interests and prosperity, but at the same time, for the cause of science and knowledge generally. Suggestions thrown out by the most ignorant, have often led to the discovery of principles of the highest possible importance. And he who is engaged in the study of nature, will neglect no clue, however indistinct or unlikely it may be, to lead him to any valuable discovery, merely because he may be indebted for it to one who is, in education or natural abilities, immeasurably beneath him. Instead of seventy members, let us, if possible, get seven hundred: there are none who may not be useful, and those probably the most so, from whom at first sight we should be apt to expect the least. If this were the only benefit to be anticipated from an increase in the number of our members, it seems to me that it should be enough to induce us to exert ourselves, and to make the attempt, at least, to accomplish it.

But there are other benefits to be obtained by it. Our annual income would at once be increased to a sum nearer the requisitions of the Society than it has ever yet been. The receipts into the treasury have not varied much from between $150 to $200 a year; a sum barely sufficient to cover the ex-

penses incidental to similar institutions, and furnishing comparatively nothing towards the increase of the library, the fitting up additional cases, the publication of our Transactions, or the numerous other points which are absolutely essential to the completion of the designs of the Institute. You are of course aware, that what has been done by the Institute already, has not been simply through its annual income; donations of considerable amounts have been frequently made for special purposes. To one gentleman we have been indebted for the means of completing our collection of works on Mineralogy, and enriching our Museum with scarce and high priced specimens. To another for a work on Fossil Conchology; which, though consisting only of six octavo volumes, cannot be obtained at an expense far short of $200; and that is indispensable to the student of Geology. I might enumerate others of a similar character, but I will merely point to the splendid cases you see around you, and add the tribute of my grateful acknowledgments to the liberality of some few of our fellow citizens, who have erected here a monument to which each of us may with pride refer, as among the many proofs of the noble and enlightened spirit of the citizens of Albany. That many of them have, among the numerous claims that are constantly made upon them, deemed the Institute worthy of a portion of their contributions, goes far, in my mind, to disprove the assertion, that their purses are always closed to their own institutions, and always open to those of others. Nor must I omit to mention the debt of gratitude we owe to the Trustees of the Albany Academy, who have allowed us the gratuitous use of these noble apartments, a boon which we shall be more likely to estimate at its true value, when we consider that if it were withdrawn, our funds would not enable us to procure accommodation more than sufficient for the storage of our collections packed up in boxes. But while much has been done, and the Institute has already begun to reflect back upon the city the honor which arises from the possession of a society contributing its quota towards the advance of knowledge, much still remains behind. To effect this, money is required; and if you feel indisposed to add your time and

labor to advancing its interests, you may facilitate the labors of others, by adding to its funds. Allow me to mention a few of the objects which might be accomplished with additional means. Our library is deficient in many departments, which might be economically filled up; in ornithology, particularly, the works of Wilson, Bonaparte and Audubon, should if possible be now secured, as the lapse of a few years may prevent the possibility of its ever being done. The works which we require are not those which are to be found on the shelves of every bookstore—the compends and digests of science; in which the errors of one author are perpetuated by his successors, until it becomes at length a problem of no little difficulty to ascertain what is the exact truth in regard to a given point. But it is the originals which should here be found; the storehouses in which the knowledge and discoveries of each succeeding day have been laid up and preserved, and which are no less instructive in showing what has been accomplished, than in informing us what has been unsuccessful. The fact may not be generally known, but is undoubtedly true, that of the numerous inventions and discoveries which so abound throughout our country, and on which we are apt to pride ourselves, as proving the superior ingenuity of our countrymen over the rest of the world, a large proportion are described and figured in works belonging to our library, some of which go back nearly two hundred years. These inventions have many of them been tried and fallen into disuse, again to be invented to pass through the same trial, and to encounter the same neglect. A knowledge of what had been done and the result, would in all probability in every such case have prevented the waste of the money, time and ingenuity expended in the vain attempt to bring to perfection what had been found insufficient, and might have induced another and more profitable direction to the same expenditure. These originals are the Transactions of Scientific Societies, and the Journals of Science and Art; of the latter we possess an extensive and highly valuable collection of what have been published in England, but of those that have appeared upon the Continent of Europe, we cannot boast a single specimen. Many of the volumes in our

library are the donations of various societies and individuals, and were the catalogues of the library printed, it is not at all unlikely that the immediate returns in works which would be observed to be wanting upon our shelves, would more than cover the whole expense of publication. The continuation of our Transactions is almost at a stand, for want of the necessary funds; the number of subscribers is not sufficient to defray the whole expense, and it has not been deemed advisable to incur a debt which might hereafter prove a source of uneasiness. It is by this publication, however, only that the Institute can become known abroad, or can expect to participate in the benefits of those interchanges which have become established throughout the literary and scientific world.

The privilege of making use of instruments of superior manufacture and higher value than can ordinarily be expected to be owned by individuals, is another advantage held out to its members, by societies like ours; but in our case we possess nothing of the kind. The very instruments which are used in making the quarterly observations recommended by Sir John Herschel, are borrowed for the occasion. It is of the highest importance to the interests of the Society, that this deficiency should be supplied. A barometer and thermometer of the best construction and nicest accuracy, an instrument to ascertain the magnetic dip and variation, and a reflecting goniometer, are some of those which, if owned by the Institute, would probably be employed constantly, with the certainty of adding facts of the highest value to the mass which every day is accumulating throughout the world. The subjects which I have thus mentioned, are only a few of those which might be pointed out, and are perhaps the most important only in my individual estimation; their suggestion will, however, serve the purpose I have in view, which is simply to shew that there are desiderata which may be supplied with little exertion, if properly directed.

The only remaining benefit I shall mention as to be expected from an increase in the numbers of our members is, that it would bring within our reach one of the most influential principles of our common nature, sympathy. How much so-

ever philosophers may dispute about the mental faculties, all are agreed upon the means by which this feeling may be excited and directed. Of these, the most essential is numbers; a statement which might be coolly and dispassionately, perhaps incredulously, listened to by a few without producing any especial effect upon them, if made to the same persons among a numerous multitude, will be likely to affect them nearly, if not quite, as much as the most enthusiastic of the crowd; doubts and difficulties vanish; and when we review in solitude that with which we were carried away in the tumult, we might be almost induced to doubt the evidence of our recollection. That it may be, and in fact often is, perverted to the vilest purposes, instead of affording a sufficient reason against availing ourselves of it for good and noble ends, should, on the contrary incite us to its employment. It is the principal inducement that influences us to form associations for distinct purposes. The naturalist who has expended long and painful hours in the examination of some obscure point in science, feels himself at length amply rewarded, and urged to new exertions, by the cheering applause of those to whom he communicates his labors. One of the most striking accounts of the operation of this principle, is given in the record of the proceedings of the British Association for the advancement of Science, at its recent meeting in Bristol. A gentleman almost entirely unknown as a naturalist, at the request of some of his friends, communicated an account of his voltaic experiments, pursued for years in the deepest retirement, by which he had succeeded in imitating nature in some of her most obscure operations. He had, in other words, effected the formation of crystals of quartz, carbonate of lime, and other minerals, from watery solutions. The effect was indeed electrical; loud peals of applause frequently interrupted his communication, and were continued for several minutes after he had finished. The assemblage though large, was principally composed of the philosophers of Britian, and one of these, the Rev. Mr. Conybeare, declared himself to be so excited with the intelligence, as to be unwilling to submit the observations which he had intended to make. Now, although much of this feel-

ing is attributable to the highly interesting discoveries promulged, yet the greater portion is unquestionably due to the effect of sympathy, rendered contagious and unavoidable by the number of the audience.

A regular attendance at the meetings of the Society, is another of the duties incumbent upon each of its members, which has been perhaps too much neglected. It is this only which will render them interesting and profitable. Few, if any, will take the trouble to prepare communications to be read at meetings at which it is probable there may not be a quorum present; and instead of the want of matters of interest being a sufficient excuse for your non-attendance, that want is, in my opinion, mainly caused by the non-attendance. What inducements do you hold out to those who are willing to give their labor to the collection and diffusion of useful and entertaining knowledge, when even the regular stated meetings of the Institute, amounting to only eight or nine in the course of the year, are not honored with a full assemblage? It is in vain, and worse than useless, to expect that much or almost any good is to be accomplished by you as a society, unless you yourselves feel an interest in it, and exhibit the proof of it.

In the eloquent address which was delivered before you a year ago, the subject of regular courses of lectures to be given under your immediate direction, was urged upon you as an important means of contributing your quota towards the efforts that were then and are still making, to give a higher character to the instruction of your fellow-citizens. I mention the suggestion now, merely for the purpose of adverting to the success which has attended the practical application of such a system in the Young Men's Association of this city; and to lend my aid by agitating the question again to certain action upon the subject. Even should the immediate success be not so great as might be anticipated, the simple fact of making the existence of our Society more generally known to our fellow-citizens, of bringing them together, and shewing them what has been done towards collecting a museum of natural history, could not fail of doing great and permanent good.

If, however, you desire not merely to discharge an assumed

duty, but in addition are willing to advance a step further, and to contribute your share not merely to the well-being of the Institute, but also to the grand interests of knowledge, you can do so, not only without interfering with your other pursuits, or subjecting yourself to any toilsome or disagreeable task, but with a positive increase of pleasure, and the certainty that you are adding to your immediate usefulness in whatever sphere your lot may be cast. And this, by leaving the station of passive observers, and joining the ranks of science militant. We are all of us, even in spite of ourselves, observers; the possession of the organs of sense deprives us almost of the power of remaining wholly ignorant of the great operations of nature that surround us on every hand. But so long as we neglect to impress these phenomena on our recollection, by recording them for examination by ourselves or others, our observation, however precise and accurate it may be, is utterly valueless. And not only valueless, but by constantly repeating the same process, we soon lose all interest in what we see, or hear, or feel; and instead of making our senses contribute to the intellectual supply, which is almost as necessary to the health and strength of the mind, as is food to that of the body, we wilfully deprive ourselves of their advantages, and counteract so far the design of our creation. In some of the sciences which are thence termed experimental, we are able by repeating the phenomena we are engaged in studying, to arrive at positive results with ease and rapidity; but in the greater number of them the phenomena are such that we cannot repeat them by any experiments in our power, but are obliged to wait until they again occur in the regular course of nature. To enable us, therefore, to make any approach towards a knowledge of such phenomena, or of the laws which govern them, we must observe each of them as it occurs, and not trusting to mere recollection, record our observations, if possible, on the spot, or as soon afterwards as circumstances will permit, and before we have forgotten any of the attendant circumstances. To do this with the certain prospect of benefitting science, it is not necessary that we should be familiar with scientific pursuits, or even with the particular branch to which our situa-

tion, circumstances, or peculiar disposition induces us to make the object of our attention. There are none of the sciences, indeed, in which accurate observations, if made carefully and truly related by an intelligent person, are not extremely valuable. At the same time it is no less true, that to render any person a perfect observer, he must be not only intimately acquainted with the particular science to which his observations relate, but must also possess a competent knowledge of all the others, that so he may be enabled to estimate properly the relative importance of the accompanying circumstances, and thus give the closest attention to those which are necessarily connected with the phenomenon, rather than to those which are merely accidental and noways essential to it. But while the knowledge of this truth should teach us the utmost caution in employing our observations in the formation of general theories or laws, it should not prevent us from recording, or even publishing them. Neglecting to do so, we deprive ourselves of the only means of ascertaining their accuracy by comparison with others, or of being led to the discovery how we may in future avoid the errors into which we have been incautiously led. I know that great complaint is often made of the uselessness of multiplying records of observations, and more especially of those made in Meteorology. But the fault complained of is principally that an immense mass of observations are given, without any averages or means being calculated; that no particulars are given as to the accuracy or position of the instruments, and very frequently that the hours of observation are not mentioned. Now these objections do not apply to the observations themselves, but simply to imperfections in recording them. To judge of their value, we require to be informed whether the indications of the instruments are nearly accurate, or whether they require correction; whether their position is such as to secure them from extraneous influence, or whether the hours at which the observations were made, are such as experience has shewn to be most proper. For instance, a meteorological register may be kept with great care, and yet be utterly valueless for the purposes of science, by the inaccuracy of the thermometer, by its being placed so as to be

affected by the radiation, reflection or conduction of heat from neighboring bodies, or by its observation at such hours as will not represent the mean of the twenty-four; by the deterioration of the barometer from the intrusion of air into the tube, by its wanting an apparatus for ascertaining its zero, and by its being observed at hours which will not exhibit either the daily oscillations of the column, or its mean annual height. A remarkable instance of labor almost thrown away, is found in a series of observations made by a Professor in a celebrated college, under the direction of a learned Society, where the times of observation of the barometer were those, neither of its maximum, minimum or mean, nor even fixed hours, but one of them was the fluctuating period of sunrise, and where, from the close agreement of the results, he pronounced the notion of a daily oscillation of the column, not to be supported by these observations. In this case the observations were nearly valueless, from the selection of improper hours, and the deduction of the inference showed a want of caution truly surprising. Yet even with these drawbacks, these observations are better than none at all, although a little attention to the subject would have rendered them almost inestimable. While, however, care and accuracy are to be always studied, I would warn you against the opposite fault, of undervaluing your own observations because they may not possess the latter quality in the highest possible degree; this feeling when carried to its extreme, has, I doubt not, in many instances proved not merely detrimental to the cause of science, but also, and in a much higher degree, to the individual himself. Some confidence in ourselves is requisite here as well as in every occupation of life; and he who fears to relate what he has observed, lest he may be repeating a twice told tale, will never do much to advance science or his reputation. Guarding, then, by all the means with which we may be acquainted, against inaccuracies, I would impress on each of you, if possible, the conviction of the importance of forming the habit of observing and recording some natural phenomena at stated periods of each day, the rapidity with which it will become a source of pleasure, will soon add an agreeable surprise. Take, for instance, the direc-

tion and strength of the wind, and you have a subject upon which well arranged facts are of the highest importance. The course of the clouds, one would hardly suppose, observed any approach to regularity; and yet you will find that the upper strata are wonderfully constant, and that when two or three distinct strata can be seen, which is frequently the case, you have exhibited to you the strange phenomenon of different strata of the air above us, moving at the same time in opposite directions. The times of flowering of different trees and plants; the periods of the annual departure and return of birds, and numerous other similar subjects might be suggested, but I shall content myself with referring to White's Natural History of Selborne, one of the most delightful books in our language, as an evidence of how much agreeable and useful information may be collected by any one who chooses to attempt it, with even more moderate scientific attainments than any of you can acquire with scarcely an effort. It is the constant exercise of this habit which gives such a charm to the narratives of intelligent travellers; that renders every spot, however barren and devoid of interest it may appear to another, rich in objects of interest and wonder to him who has cultivated it. It almost adds another sense to those with which man has been endowed, or rather it is the perfecting and improving them, instead of suffering them to lie torpid and to decay through want of use.

I have said that this habit will interfere with no pursuit or profession to which you may be bound, and I repeat it; because I know that the objection is often urged, that it is incompatible with an attention to business, and more frequently perhaps believed and acted upon, than expressed. But the objection is not founded in reason, and experience does not disprove the conclusion to which reason inevitably conducts us. There is no knowledge or information, however trifling and unimportant it may at the moment seem, that will not, if we make it our own, sooner or later stand us in good stead. Such is the assertion of age and experience repeated over and over again, by the most learned and wisest men. And he must be fortunate indeed, who has never felt regret at being unable to re-

call facts or illustrations, which when he first met them, seemed hardly worth the preservation.

But time you may think is wanting; you may be constantly employed, and the little portions of the day which are not occupied with business, must be given to relaxation and exercise; these, then, are the portions which you should give to observation; and you will soon find that it affords not merely relaxation, but revives and strengthens the faculties oppressed and overpowered by intense application to an absorbing pursuit. It brings into exercise faculties of the mind which might otherwise have remained dormant, and thus relieves us from fatigue, not by absolute rest which can never effect such end, but by change of activity. Nor must it be supposed that these little fractions of time are insufficient to lead to any valuable result. If faithfully and regularly employed, they will enable us to effect almost any purpose we can form. The most distinguished authors have left upon record their warning against the pursuits of literature as a profession, and their testimony that far more can be effected by the application of a certain regular portion of the time, that even the most engrossing pursuit will always afford to him who desires it, than by making it the sole and constant employment. You all recollect the anecdote of the French Chancellor, who finding that his wife never came down to dinner until fifteen minutes after she had been summoned, appropriated that time to writing, and in a few years had amassed a large collection of folio volumes as the result. One hour a day faithfully employed, will enable any one to make in a few years a collection of observations far surpassing in value any estimate which should previously be formed, and that was at all within the limits of probability. Constancy and regularity are the only indispensable requisites; and without these, nothing valuable can be produced, no matter how great be the expenditure of time.

Neither the mechanic, the merchant, nor the professional man expects, when entering upon life, to continue busily engaged until its termination; no one thinks to die with harness on; but each looks forward (no matter how obscure may be the prospect) to the period when his toil-won gains will enable

him to retire from the busy paths which he has trodden during youth and manhood, to spend the evening of his life in more appropriate ease and quiet. But if he at length succeeds in his wishes, unless he have provided some mental resource or occupation for his retirement, it becomes irksome and intolerable: and he finds that the gratification of his wishes has not added to his happiness, but the reverse. If, however, he will, while engaged in business, choose for his amusement that which he intends for his occupation in retirement, he will accomplish all that he desires. He enjoys the present gratification, and quitting business, he assumes an occupation that custom has endeared. He is relieved from the embarrassment of having to devise and become familiar with that which is strange and foreign to his habits and pursuits, which is often too powerful to be overcome. And where can we look for nobler or more fitting employment for this period of life, than is afforded by the sciences, or the contemplation of the laws of nature. Here "contradictions or irregularities never occur, but all is harmony. Apparent exceptions become regular, and equivoque in her sublime legislation, is as unheard of as maladministration."

It may, however, occur to some, that a position in a city is not favorable to such an application of his leisure; that if his residence were somewhere else, the inducements held out might be irrisistible, but that here the attempt would be useless. Nothing can be more unfounded than such a surmise; there is not one of the sciences that cannot be advantageously studied here, and many of them with opportunities superior to those afforded by other places apparently more favorably situated. Laying entirely out of view the valuable collections of literary and scientific books which are to be found here, it may with truth be asserted, that there are few places which possess in their rocks, streams and fields, greater attractions for the student of natural science than Albany. Our sands, clays and rocks present a field of almost unlimited extent for geological researches, and would amply repay the most minute investigation: more especially as they are among those to which, in this country, the least attention has been paid. Nor is it their

presence alone that renders this a favorable spot, the occurrence of the deep ravines which are found in every direction, furnish extensive natural sections on every hand. The broad and noble river that flows in front of us, affords an opportunity of studying with unusual advantage one of the great processes of nature, which apparently trifling, from its constant action, has been shewn to be capable of performing an important part in the production of those changes upon the surface of the earth, that in the earlier stages of geological science tasked the most fervid imaginations to furnish deluges and unheard of convulsions, to account for. Our streams and canal abound with fish, shells and reptiles; while the votary of Botany may reap a rich harvest from the luxuriant and varied vegetation of our uncultivated fields. "Meteorology too, one of the most complicated and difficult, but at the same time interesting subjects of physical research," may here be cultivated with every advantage. The developments of his theory, which have recently been made here by Mr. Espy, have, it is to be hoped, excited an interest in the subject, which will not entirely pass away without producing valuable results. As citizens of New-York, too, we should take a greater interest in this science, from the fact that the most extensive and valuable contributions which have of late years been made to it, are due to the enlightened action of the Regents of the University.

But it is not to the natural and physical sciences alone that you need confine your attention; setting them entirely aside, the field of research is still ample, and in this country as yet hardly entered upon. The department of Statistics opens a world almost in itself, and promises to its cultivators the richest rewards. Nor must you deem it a dry and repulsive study; it is susceptible of being made the most intensely interesting, by exhibiting to us views of order and regularity pervading not merely the works of nature, but even the artificial institutions of men, of which we should not otherwise possess the most indistinct conception. Few things are apparently more uncertain than the occurrence of sickness or death, and yet we know that when our observation is carried over a sufficient

extent, smaller irregularities disappear, and general laws may be deduced; which, though they may not enable us to guard against or prevent them to any very great extent, point out the means by which their consequences may be materially mitigated. So also in the case of crime, the statistics of this subject properly collected and arranged, at once bring to view facts in the highest degree startling, and which go far towards pointing out the appropriate means which should be employed for its prevention. A single fact of undoubted truth may perhaps show that I have not much exaggerated their value on this subject. In England, one-half of the offenders against the laws of their country, are under 20 years of age; one-tenth under 16, and one-sixtieth under 12; a fact which never could have been known, unless statistical collections had exhibited it. Here, indeed, the interference of government is perhaps necessary to supply complete details, and it is for you to direct its attention to it. If you compare the censuses which have been taken at different times under the direction of our general and state governments, you will at once be struck with the vast improvement in those of later years; and yet, examined with a view to statistics, even these are susceptible of still further improvements. The making and enforcing of well founded suggestions on the proper authorities, is one of the legitimate objects of societies like our own, and when judiciously done, will always receive respectful attention. But even if confined to our own city, the researches of one individual would in a very short time accumulate a mass of information of the highest interest, and which is now no where to be found. The number of commitments to jail, the proportion of indictments found, and of convictions under them; the number of schools and scholars; the amount of merchandize annually brought into and taken from the city; the number of travellers who arrive at and depart from it; are some of the points of very different character that may be mentioned as tending to show the extent of the field. An infinitude of similar subjects will suggest themselves on the slightest reflection, not one of which would not afford ample scope for the exercise not merely of industry, but of talent and skill.

I have thus pointed out, imperfectly I am aware, a few of the modes which are within the power of each of you, by the employment of which you may discharge the duty you have undertaken in becoming members of the Institute. The subject is far from being exhausted, but I have desired rather to excite attention and inquiry, than to weary your patience by an enumeration of the almost infinitely diversified methods which ingenuity could suggest. If I have succeeded in doing this, my aim has been accomplished.

To render our Association completely successful, depends not upon the zeal or acquirements of this or that member, but upon the willingness of each to contribute his exertions towards it. It is not by speculation and generalization to which our minds are always prone, that we can materially benefit ourselves, or add to the stock of useful knowledge. These, instead of requiring encouragement, should rather be repressed and discouraged. To be of any ultimate value, they require more extensive acquaintance with the facts brought out by observation and experiment, with their relative importance and connexion, than any of us can boast of, or could acquire without an entire devotion of all our faculties to science. They may be safely left to the Herschels and the Humboldts, the giants in knowledge and intellect, while we may contribute materially to lessen their labors, by choosing the humbler, but not less necessary, task of collecting and verifying facts. It is only those who know nothing of science or its pursuits, who would be inclined to undervalue and sneer at these worthy contributions, while they would applaud to the echo, the frothy, empty declamation, which affects the ear, but does not reach the mind. Here each of you can do something, and you should dismiss at once and forever the thought, that because you cannot do all, or even any thing very great or remarkable, there is no necessity for your doing any thing. The water, the sand, the lime, and the brick, are as indispensable to the completion of the lofty edifice, as the towering column or the sculptured shaft. Genius, whatever it may be, no longer sways the sceptre over the realms of science. Great and noble ends indeed are to be achieved, but the means which

can alone ensure their accomplishment, are comparatively humble. They are patient labor and sober thought; these each of you can give, and with these every thing can be accomplished.

Since this address was delivered, I have met with the following passage in Dr. Young's lectures, delivered at the Royal Institution of Great Britain, which affords a proof that the assertion made in page 233, of our own country, is true also in England:

"We may also be able to render an important service to society, and to confer a still more essential benefit on individuals, by repressing the premature zeal of unskilful inventors. We need only read over the monthly accounts of patents intended for securing the pecuniary advantages of useful discoveries, in order to be convinced what expense of time and fortune is continually lavished on the feeblest attempts to innovate and improve. If we can be successful in convincing such inconsiderate enthusiasts of their real ignorance, or if we can show them, that even their own fairy ground has been preoccupied, we may save them from impending ruin, and may relieve the public from the distraction of having its attention perpetually excited by unworthy objects. The ridicule attendant upon the name of a projector, has been in general but too well deserved; for few, very few, who have aspired at improvement, have ever had the patience to submit their inventions to such experimental tests as common sense would suggest to an impartial observer. We may venture to affirm, that out of every hundred of fancied improvements in arts or in machines, ninety at least, if not ninety-nine, are either old or useless: the object of our researches is, to enable ourselves to distinguish and to adopt the hundredth. But while we prune the luxuriant shoots of youthful invention, we must remember to perform our task with leniency, and to show that we wish only to give additional vigor to the healthful branches, and not to extirpate the parent plant."

TABLE I.

Art. XII. Meteorological Observations *made on the days suggested by* Sir John F. W. Herschel.

HOURLY METEOROLOGICAL OBSERVATIONS

***Made at Feldhausen, at the Cape of Good Hope, on the 20th, 21st and 22d September,* 1836.**

By Sir John F. W. Herschel.

No.	Mean time of observation according to astronomical reckoning.	Barom. reduced to 32° Fahr. and to the R. S. standard.	Interpolated barometer for the exact hours of M. T.	External thermometers corrected for Zeros.		Actinometer interpolated for the time in column 2.	Wind.		Quantity of blue sky.	Weather. Capt. Beaufort's abbreviations.	Nocturnal radiation.		Temp. at bot. of well.
				Dry.	Wet		Direction.	Force.			Therm. over reflector.	Therm. on ground.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Se. 20. h. m.	in. dec.											
1	18 9	30.202	30.201	49.7	44.8	1.8	S ?	0	9	*b v*			
2	19 9	30.206	30.205	52.6	47.7	12.6	S	1	9	*b v*			
3	20 9	30.211	30.210	56.2	47.6	22.0	S	3	9	*b v*			
4	21 9	30.215	30.214	57.7	48.7	28.0	S	4	8	*c*			
5	22 9	30.197	30.200	58.7	49.3	31.7	S	3	10	*b v*			
6	23 9	30.179	30.182	60.5	51.4	32.9	S	2	10	*b v*			
	Se. 21.												
7	0 10	30.165	30.167	61.3	52.3	33.7	S	1	10	*b v*	.....	.....	58.15
8	1 10	30.144	30.146	61.8	55.0	33.5	S	1	10	*b*	.....	.....	58.05
9	2 10	30.130	30.132	62.25	53.3	32.5	S	3	10	*b*	.....	.....	58.05
10	3 10	30.115	30.117	61.4	53.3	31.0	S	1	10	*b*	.....	.....	57.95
11	4 10	30.118	30.118	59.4	52.8	23.0	S	2	10	*b*			
12	5 10	30.128	30.126	56.5	51.3	.....	S	1	10	*b*			
13	6 10	30.124	30.125	54.6	50.3	.....	S	1	10	*b*			
14	7 10	30.120	30.121	52.5	48.6	.....	0	0	10	*b*			
15	8 11	30.118	30.119	51.7	48.5	.....	0	0	10	*b*			
16	9 11	30.110	30.111	51.5	47.3	.....	0	0	10	*b*			
17	10 11	30.090	30.093	50.2	47.3	.....	S	1	10	*b*			
18	11 11	30.069	30.072	49.4	45.5	.....	S	1	10	*b*			
19	12 11	30.061	30.062	47.6	43.6	.....	S ?	0	10	*b*	40.76	42.45	
20	13 11	30.040	30.043	47.1	43.0	.....	0	0	10	*b*	39.56	40.35	
21	14 11	30.020	30.023	46.5	43.0	.....	0	0	10	*b*	39.76	40.05	
22	15 11	30.004	30.007	45.8	42.3	.....	S	1	10	*b*	38.76	39.85	
23	16 12	29.991	29.993	45.5	41.4	.....	0	0	10	*b*	38.66	39.45	
24	17 12	29.991	29.991	47.7	43.8	.....	0	0	10	*b*	39.66	39.85	
25	18 12	29.985	29.986	47.7	44.3	3.6	0	0	10	*b*	40.06	41.35	
26	19 12	30.003	30.000	52.5	48.9	16.0	0	0	10	*b*			
27	20 12	30.005	30.005	60.6	55.2	24.4	0	0	10	*b*			
28	21 12	30.007	30.007	64.0	54.8	28.8	0	0	10	*b*			
29	22 12	29.999	30.000	66.9	55.5	32.7	0	0	10	*b*	.....	.....	58.05
30	23 12	29.991	29.992	69.5	57.1	35.0	0	0	10	*b*			
	Se. 22.												
31	0 13	29.975	29.978	70.5	55.3	36.7	0	0	10	*b*			
32	1 8	29.956	29.959	72.7	56.0	35.0	0	0	10	*b*			
33	2 8	29.932	29.935	75.3	56.3	35.7	0	0	10	*b*			
34	3 6	29.927	29.927	74.5	55.8	35.0	0	0	10	*b*			
35	4 13	29.920	29.921	71.4	57.3	27.3	0	0	10	*b*			
36	5 13	29.933	29.930	64.8	56.4	.....	0	0	10	*b*			
37	6 8	29.955	29.952	59.8	52.5	.....	0	0	10	*b*	.....	.....	58.05

REMARKS ON THE FOREGOING TABLE.

Cols. 2, 3, 4.—The times set down in column 2 are those obtained by subsequent correction for error and rate of a common pocket watch, unfortunately used during the observations without due examination of its state. The error was noticed during the progress of the observations; but having already proceeded some length, it was thought better to adhere to the integer hours as shown per watch, than to make a sudden break in the series. To obviate as far as possible this inconvenience, in comparing these with observations at other stations, col. 4 contains the interpolated heights of the barometer for exact integer hours of mean time. The zero correction applied to reduce the readings of the barometer to the Royal Society's standard has been taken at +0.042: the instrument having undergone a change to the apparent extent of 0.020, since the observations at the June solstice, for which I am at a loss to account.

Cols. 5, 6.—The thermometers used for these columns are the same as heretofore, only reduced to standard values by the application of their respective zero corrections.

Col. 7.—The actinometer was observed during the whole of both days, from sunrise te its disappearance behind the Table Mountain. Upwards of 200 measures of the solar radiation were thus procured on the 21st, and about 150 on the 22d, the opportunity being remarkably favorable for that object. The whole of each series was then graphically interpolated, (without introducing any theoretical supposition,) and the results of this interpolation, for the exact moments in col. 2, are registered in col. 7, so as to correspond strictly to the times of reading the thermometers. It will be noticed that the maximum of solar radiation precedes that of temperature by full two hours—a result which might be expected from the relation of the phenomena to each other. The details of these observations, which are not a little instructive, will find a place elsewhere.

The weather, as will be seen in cols. 8..11, was, during the whole interval embraced in these observations, magnificently serene, affording room for little remark beyond this general one. At noon on the 21st, the polarization of the sky light was examined by means of a polariscope, consisting of a plate of tourmaline, with a crystal of nitre adjusted on the side next the sky. It was strong in all parts of the sky remote from the sun; but chiefly about 2 deg. below the south pole, or 92 deg. from the sun, at which point it seemed to attain its maximum, but continued very intense down to the southern horizon.

The columns 12 and 13, headed Nocturnal radiation, contain the corrected readings of two similar and equal **naked thermometers**, by Crichton, having balls about the size of a large pea, the one laid on a bit of black crape on the ground, the other suspended vertically one inch over a polished metallic reflector 19 inches in diameter, and 20 feet in focal length, laid flat on the ground. Little can be concluded, however, from these observations, which speak no definite language, and undoubtedly afford no sort of measure of the actual loss of heat from the earth's surface by radiation.

Col. 14 contains the temperature of the bottom of a well 23 feet deep, (16 of which were occupied by water). It was taken by a delicate thermometer (one of Crichton's above mentioned), by sinking a thick stone bottle full of water, well stopped, and letting it remain constantly at the bottom, except when rapidly drawn up for the purpose of immersing and reading off the thermometer. The readings are corrected for zero of the thermometer.

NOTES TO THE OBSERVATIONS.

(*References to Numbers in Col.* 1.)

1. Cloud along the summit of the Table Range to westward. All clear to E.
2. Splendid morning. Less cloud on the mountain.
3. Clouds as in last observation.
4. Cloud increased on the mountain, and occasionally drifting across the sky in cirrocumular patches.
5. Pure and serene in all quarters. Polarization of sky light very strong.
6. Ditto.
7. Ditto. Polarization a maximum at about of 92 deg. from sun, or 2 deg. below south pole; but very strong thence down to the south horizon.
8. The mountain is dim with a blueish haze.
9. Ditto. Haze strong.
10. Ditto.
11. All details of the Table Mountain obliterated by grey or blueish haze.
12. Sun intercepted by mountain. Actinometer observations of course discontinued.

13. Superb moonlight evening.
14, 15, 16, 17. Ditto.
18. Very slight dew on herbage. Thermometers laid out for night radiation.
19, 20, 21, 22, 23. Dew as before, hardly increasing.
24. No apparent reason for this remarkable rise of the thermometers.
25. Magnificent sunrise.
26. Superb sky, calm, and every thing most favorable for the actinometer observations.
27, 28, 29, 30, 31. Ditto, ditto, observed the sun: it has a very large spot in an elliptic group of smaller ones. Diameter of Penumbra by micrometric measure, =58.″4.
32, 33, 34, 35. Ditto, ditto.
36. Sun interrupted by the Table Mountain.
37. Evening calm, serene, and delightful.

NOTES TO THE OBSERVATIONS OF TABLE II.

6. Fine; light clouds and wind; sharp frost.
7. Cloudy; light brisk wind; do
8. do do do
9. Overcast; do do
10, 11, 12. Overcast; snow; light brisk wind; sharp frost.
1, 2, 3, 4, 5. Fine; light clouds and wind.
6, 7. Cloudy; light brisk wind.
8, 9, 10, 11. Overcast; light wind.
12. Overcast; light snow; air frosty.
1, 2. Overcast.
3. do light snow and wind.
4, 5. do do
6. Cloudy; light wind.
7, 8, 9. Overcast: light wind.
10, 11. Cloudy; light wind.
12. Fine; broken clouds; light wind.
1. Cloudy; slight thaw.
2, 3, 4, 5, 6*. Overcast; light brisk wind.

* In the evening snow, with sharp frost; as also the day previous to the observations being commenced.

TABLE II.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Royal Society, Somerset House, for 37 successive hours, commencing 6 *A. M. of the* 21*st of March,* 1837, *and ending* 6 *P. M. of the following day.*
(*Greenwich mean time.*)

By Mr. J. D. Roberton, Assistant Secretary Royal Society.

Hours of observa.	Barometer, flint glass.	Barometer, crown gla.	Attached thermom.	External thermom.	Old standard barom.	Attached thermom.	Dif. of w & dry bu. th.	Dew point.	Rain in inches.	Wind.
6 A. M.	29.890	29.884	34.5	26.4	29.893	33.8	01.2	24	....	N
7	29.892	29.882	34.8	27.4	29.891	34.0	01.1	25	....	NNE
8	29.879	29.871	35.7	29.3	29.885	34.9	00.0	28	....	W
9	29.861	29.853	36.0	30.8	29.867	35.3	00.1	25	....	WNW
10	29.851	29.841	36.3	31.3	29.857	35.9	00.2	29	....	W
11	29.837	29.827	36.2	30.7	29.843	36.2	01.2	28	....	N
12	29.821	29.309	35.7	31.4	29.827	36.8	00.5	28	....	W
1 P. M	29.794	29.786	36.9	32.6	29.808	37.3	00.2	28	....	N
2	29.772	29.760	37.1	33.2	29.786	37.4	00.1	28	...	do
3	29.776	29.760	37.2	34.7	29.779	37.6	01.7	29	....	NNW
4	29.754	29.744	37.2	34.3	29.766	37.6	03.8	29	....	NW
5	29.758	29.750	37.0	31.8	29.772	37.4	01.2	27	....	E
6	29.764	29.758	36.8	31.4	29.778	36.8	01.1	26	....	do
7	29.762	29.756	36.5	30.6	29.768	36.3	00.7	28	....	ESE
8	29.763	29.757	36.2	30.2	29.766	36.2	00.6	29	....	
9	29.757	29.749	36.0	30.4	29.762	35.6	00.6	29	....	
10	29.751	29.743	36.2	30.7	29.752	35.7	00.5	25	....	
11	29.743	29.737	36.4	30.6	29.744	35.7	00.4	27	....	
12	29.732	29.720	36.6	30.6	29.734	35.8	00.2	28	....	
1 A. M.	29.726	29.720	36.7	30.5	29.730	36.0	00.3	27	....	
2	29.716	29.708	36.5	30.3	29.722	36.2	00.3	28	....	
3	29.711	29.703	36.3	30.2	29.713	35.7	00.2	27	....	
4	29.713	29.707	36.2	29.8	29.720	35.5	00.0	26	....	
5	29.713	29.703	35.9	30.0	29.713	35.4	00.0	26	....	
6	29.719	29.713	35.8	29.4	29.722	35.2	00.2	25	....	NW
7	29.736	29.730	35.4	29.4	29.738	35.2	00.0	25	....	E
8	29.750	29.744	35.4	29.5	29.750	35.2	00.0	25	....	do
9	29.765	29.755	35.8	31.0	29.774	35.4	00.0	24	.102	do
10	29.774	29.766	37.5	34.6	29.782	36.5	03.8	28		do
11	29.775	29.769	38.2	36.2	29.786	37.6	04.9	28	...	S
12	29.780	29.770	38.2	35.7	29.792	38.0	03.9	28	....	ESE
1 P. M.	29.774	29.766	38.0	35.7	29.786	38.3	02.2	23	....	do
2	29.772	29.766	37.8	35.2	29.784	38.0	00.2	22	....	do
3	29.774	29.768	37.7	34.7	29.788	37.8	00.3	25	....	do
4	29.780	29.772	37.6	34.6	29.792	37.7	00.1	22	....	do
5	29.796	29.778	37.2	33.3	29.812	37.6	00.4	24	....	do
6	29.812	29.804	37.2	32.5	29.824	37.2	00.2	26	....	do
Means,	29.777	29.769	36.6	31.6	29.784	36.3	00.9	26	.102	

* Melted snow.

The observations of the barometer (flint and crown glass) are severally corrected for temperature, as also for capillarity.

The water in the cistern attached to the wet and dry bulb thermometer was frozen, during nearly the whole of the observations.

[For notes to the observations of this table, see preceding page.]

TABLE III.

METEOROLOGICAL OBSERVATIONS

Made at the Apartments of the Albany Institute, Albany Academy, for 37 successive hours, commencing at 6 A. M. of the 21st of March, 1837, and ending at 6 P. M. of the following day.

Lat. 42° 39′ 3″ *N.; Long.* 73° 46′ 38″ *W.*

By a Committee of the Institute.

Hours of observation.	Barometer corrected.	Attached thermometer.	External thermometer.	Wet bulb thermometer.	Dew point.	Winds.	Force.	Clouds from.	REMARKS.
6 A. M.	30.119	27.75	24.50	.....	15.0	.....	calm.	SE	Overcast; br. stripE
7	30.089	30.00	27.00	26.0	17.0	NNE	light.	do	do
8	30.097	31.00	29.50	27.5	16.0	NE	ve. lt.	do	do
9	30.102	34.50	33.00	31.0	...	E	do	.....	do
10	30.095	43.50	42.25	41.0	23.0	SE	do	.....	do
11	30.080	49.00	48.50	43.0	26.0	SSE	do	.....	do pleas. breeze.
12	30.078	49.75	49.50	44.0	27.5	do	fresh.	SE	do
1 P. M.	30.065	51.50	52.00	45.5	28.0	do	do	do	do
2	30.053	52.00	51.75	44.0	28.0	do	do	.....	do
3	30.047	48.50	48.50	43.5	30.0	do	do	.....	do
4	30.053	44.00	43.00	38.0	30.0	do	do	.....	do
5	30.053	42.00	40.50	37.5	30.0	do	do	.....	do
6	30.023	40.00	38.50	37.0	30.0	S	do	.....	do com. raining at
7	30.055	39.00	37.00	36.0	30.0	do	do	.....	Rain. [6h. 15m.
8	30.051	38.75	36.50	36.0	30.0	do	do	.....	do
9	30.028	38.00	36.00	35.0	30.0	do	do	.....	do
10	30.010	37.50	35.50	35.0	30.0	do	do	.....	do
11	29.958	38.00	35.50	35.5	30.0	do	do	.....	do
12	29.998	38.00	35.50	35.50	32.0	do	do	.....	do slight.
1 A. M.	29.978	38.00	36.00	36.00	30.0	do	do	....	do cls.br. in E hor.
2	29.955	39.00	36.50	36.50	30.0	do	do	.....	do
3	29.953	38.00	36.00	35.00	30.0	do	do	.....	do
4	29.928	38.00	36.00	35.75	30.0	do	do	. ...	do
5	29.898	38.00	36.50	36.00	30.0	SSE	do	.....	do
6	29.893	38.00	36.50	36.00	30.0	do	do	.....	do increasing. [inE
7	29.900	39.00	37.00	36.00	31.0	do	do	SE	do brisk; str. &ci.st.
8	29.905	38.75	36.40	35.75	33.0	SE	light.	do	do cls. br'k E&N.
9	29.873	40.00	37.50	37.50	33.0	SSE	.....	SSE	do lower cls on ri-
10	29.863	40.00	38.30	37.50	31.0	do	.....	do	do [ver from NE
11	29.880	41.00	39.50	39.50	32.0	SE	.....	SE	do lower cls. on ri-
12	29.864	39.50	37.60	37.00	33.0	NW	brisk.	do	do [ver from NE.
1 P. M.	29.853	40.00	38.00	37.25	36.0	WNW	do	do	do
2	29.877	39.75	38.00	37.50	37.5	NW	.....	do	do hard.
3	29.865	39.00	37.20	37.00	36.0	do	.....	do	do and a little hail.
4	29.845	41.00	38.50	38.25	34.0	N	light.	do	do
5	29.855	39.25	37.00	36.75	36.5	WNW	brisk.	do	do
6	29.908	38.00	36.00	36.00	36.	do	do	do	do and a little hail.
Means,	29.949	39.91	38.19	37.00	29.7				Rain & snow, mea'd 8 A.M. 23d, 1.52in.

Instruments and position same as in December. Time ascertained by a transit instrument on the 18th.

TABLE IV.

METEOROLOGICAL OBSERVATIONS

Made at Montreal, Lower Canada, for 37 *successive hours, commencing at* 6 *A. M. of* 21*st March*, 1837, *and ending* 6 *P. M. of the following day.*

Lat. 45° 30′ *N.; Long.* 73° 22′ *W.*

By J. S. McCord, Cor. Sec. Natural History Society.

Hours of observation.	Barometer.	Attached thermometer.	External thermometer.	Direction of wind.	Force of wind	REMARKS.
6 A. M.	30.140	59.	13.	N	1	Cloudy.
7	30.164	59.	12.	do	1	do
8	30.150	58.	12.5	do	2	Light snow.
9	30.148	58.5	15.	NbyE	2	Cloudy.
10	30.156	58.5	16.5	do	2	do
11	30.150	58.5	19.	do	2	do
12	30.138	59.	20.5	do	2	do
1 P. M.	30.124	59.	23.5	do	2	do
2	30.112	59.	23.5	do	2	do
3	30.090	59.5	24.	do	2	do
4	30.068	60.5	23.	do	2	do
5	30.074	60.5	23.	do	2	do
6	30.084	60.	23.	do	2	do
7	30.074	61.	23.	do	2	do
8	30.056	61.	24.	do	2	do
9	30.066	61.5	25.	do	2	do
10	30.066	61.5	25.	do	2	do hail.
11	30.046	61.5	27.	do	2	do do
12	30.032	61.5	27.	do	2	do
1 A. M.	30.020	61.5	27.	do	2	do
2	30.000	62.	28.5	NE	2	do do
3	29.974	62.	32.	do	2	do do
4	29.964	62.	33.	do	2	Rain and hail alternately.
5	29.964	62.	33.	E	2	do the rain very little, hail heavy.
6	29.968	61.	33.	do	2	do do do
7	29.970	60.	33.	do	2	do do do
8	29.978	60.	33.	do	2	do do do
9	29.996	60.5	34.	do	2	Cloudy; rain and hail ceased.
10	30.000	61.	34.	NE	2	do
11	30.000	61.	35.	do	2	do
12	30.000	61.5	37.	do	2	do
1 P. M.	30.012	61.5	37.	do	1	do
2	29.990	61.5	37.	do	1	do
3	29.994	61.5	35.	do	1	do
4	29.996	61.5	34.	do	1	do
5	30.000	61.5	33.5	N	1	do
6	30.016	62.	33.	do	1	do
Means,	30.048	60.5	27.01			Bar. corrected & reduced to 32° F. 30.031.

During the whole of the 37 hours the entire horizon was covered with a dense cloud, so that neither sunset nor sunrise could be seen.

Mean temperature of the bottom of a well 31 ft. deep, for the year 1836, 45.87. Mean temperature of same well during the 37 hours observation, 40.05.

TABLE V.

METEOROLOGICAL OBSERVATIONS

Made at the Institute, Flushing, L. I., for 37 successive hours, commencing at 6 A. M. of the 21st of March, 1837, and ending at 6 P. M. of the following day.

Lat. 40° 44′ 58″ N.; Long. 73° 44′ 20″ W.

By Prof. C. Gill.

Hours of observation.	Barometer corrected.	Attached thermometer.	External thermometer	Wet bulb thermometer.	Winds from.	Clouds to.	Strength of wind.	REMARKS.
6 A. M.	30.022	50.	33.	32.	NE	S	gentle.	Thin clouds overspread.
7	.027	49.	34.50	33.75	do	.....	do	Misty.
8	.035	48.	36.	35.	do	.....	do	do
9	.032	51.	38.25	37.	do	.....	do	do
10	.042	50.	39.	37.50	do	SW	brisk.	Misty; clouds.
11	.040	52.	41.	39.	do	do	do	do
12	.037	51.	41.50	39.	do	do	do	do
1 P. M.	.030	44.	41.50	39.	do	do	do	do
2	.002	50.	42.	39.50	do	do	do	do
3	29.991	50.	41.75	39.25	do	do	do	do
4	.989	50.	40.	38.50	do	do	do	do
5	.986	50.	39.	38.	do	do	gentle	do
6	.984	49.	37.50	36.50	do	W	do	Dark clouds and rain.
7	.965	50.	38.	37.50	do	do	do	do
8	.964	50.	38.50	38.	do	do	brisk.	do
9	.961	50.	36.50	36.	do	do	do	Violent rain.
10	.954	52.	36.	35.25	do	do	do	do
11	.951	51.	36.	35.50	do	do	high.	do
12	.926	50.	35.50	35.	do	do	do	do
1 A. M.	.839	51.	35.50	35.	do	do	do	do
2	.831	51.	36.50	36.	do	do	do	do
3	.800	53.	37.	36.50	do	do	do	do
4	.794	55.	39.50	39.	do	do	do	do
5	.801	52.	42.	41.	do	do	do	do
6	.801	52.	41.	40.	do	do	do	do
7	.710	52.	39.	38.50	do	do	do	do
8	.680	52.	42.50	42.	do	do	do	do
9	.675	51.	43.75	43.	do	do	do	do
10	.656	51.	44.	43.50	do	do	ve. hi.	do
11	.655	51.	43.50	43.	do	do	do	do
12	.652	51.	44.50	44.	E	do	high.	do
1 P. M.	.650	52.	44.50	44.	do	do	do	Rain less heavy.
2	.653	51.	42.50	42.	do	do	do	do
3	.655	51.	38.50	37.50	NE	SW	brisk.	do
4	.658	50.	36.	35.50	do	do	do	do
5	.659	50.	35.50	35.	do	do	high.	do
6	.661	49.	35.	34.50	do	do	ve. hi.	do
Means,	29.859	50.50	39.	38.20				

Position of instruments same as heretofore.

Rain began at 5¼ P. M. of the 21st, and ended 9 P. M. of the 22d; commenced again at 1 A. M. of the 23d, and ended at 1 P. M. of the same day. It rained also from 5 to 6½ P. M. of the 23d, with a brisk wind.

The wind, prevailing as in the table, fell at about 3 A. M. of the 23d.

An accident having happened to the rain-guage, the depth of rain could not be measured.

TABLE VI.

METEOROLOGICAL OBSERVATIONS

Made at the Wesleyan University, Middletown, Ct., for 37 *successive hours, commencing at* 6 *A. M, of the* 21*st of March,* 1837, *and ending at* 6 *P. M. of the following day.*

Lat 41° 34′ 43″ *N.; Long.* 72° 29′ *W.*

By Prof. A. W. Smith.

Hours of observation.	Barometer corrected.	Attached thermometer.	External thermometer.	Dew point.	Direction of wind.	Strength of wind.	Direction of clouds.	Kind of clouds.	Weather.	Rain in inches.
6 A. M.	29.339	40.	30.	23.	E	strong.	SE	lt. str.	sky ne'y cl	
7	.842	39.	31.5	23.	do	do	ESE	stratus	cloudy.	
8	.847	39.	33.	24.	do	do	do	do	do	
9	.848	39.5	35.	25.	do	do	do	do	do	
10	.847	41.	37.75	26.	do	do	do	do	do	
11	.850	41.	39.50	27.	do	do	do	do	do	
12	.844	42.	41.	28.	do	gentle.	do	do	do	
1 P. M.	.840	42.5	41.	29.	do	do	do	do	do	
2	.822	43.	41.	31.	do	strong.	do	do	do	
3	.824	42.	39.	32.	do	do	do	do	do	
4	.799	42.	38.	32.	do	do	do	do	do	
5	.799	42.	37.5	33.	do	do	do	do	do	
6	.805	41.5	36.	33.	do	gentle.	do	nimb's	do	
7	.810	41.5	35.	30.	do	do	do	do	do	
8	.812	41.	34.	27.	do	do	do	do	rain.	
9	.818	40.5	33.	26.	do	strong.	do	do	do	0.02
10	.804	40.	33.	26.	do	do	do	do	flo	0.06
11	.796	39.5	33.5	25.	do	do	do	do	do	0.05
12	.781	39.5	33.5	25.	do	do	do	do	do	0.08
1 A. M.	.756	39.5	33.5	25.5	do	do	do	do	do	0.06
2	.736	39.5	33.5	27.	do	do	do	do	do	0.05
3	.719	39.5	33.5	28.	do	do	do	do	do	0.04
4	.691	39.5	33.	30.	do	do	do	do	do	0.05
5	.679	40.	34.	31.	do	do	do	do	do	0.04
6	.669	40.	34.	31.	do	do	do	do	do	0.02
7	.646	39.5	34.	31.	do	do	do	do	do	0.02
8	.639	39.5	34.	32.	do	do	do	do	do	0.06
9	.632	39.	34.	32.	do	do	do	do	do	0.05
10	.622	39.	35.	33.	do	do	do	do	do	0.10
11	.607	39.	35.	33.	do	do	do	do	do	0.09
12	.582	39.	34.5	33.	do	ve. str.	do	do	do	0.13
1 P. M.	.577	38.5	35.5	33.	do	do	do	do	do	0.08
2	.544	38.5	35.	33.	do	violent	do	do	do	0.11
3	.532	39.	36.	33.	do	do	do	do	do	0.05
4	.532	39.	36.	31.	do	do	do	do	do	0.11
5	.532	39.	35.	31.	do	do	do	do	do	0.04
6	.532	39.	34.5	31.	do	strong.	do	do	do	0.09
Means,	29.726	40.07	35.74	29.26						1.40

Some 20 minutes previous to the first observation, the sky overhead was cloudless, but the eastern horizon was skirted with clouds; just before 6 A. M. the sky was overcast with clouds from south; soon after which the upper current settled in the ESE. At 7 P. M. a few drops of rain.

The instruments and their position were the same as at the last equinox. The barometer, after the hourly observations were discontinued, remained nearly stationary till the morning of the 23d. During the night of the 22d the wind changed to NNE. The rain continued with little intermission till noon of the 23d. The whole quantity that fell from 6 A. M. of the 21st to 12 M. of the 23d, was 3.28 in

TABLE VII.

METEOROLOGICAL OBSERVATIONS

Made at Williamstown, Ms., *for* 37 *successive hours, commencing* 6 ***A. M.*** *of the* 21*st* ***March,*** 1837, *and ending* 6 ***P. M.*** *of the following day.*

Lat. 42° 42′ 44″ N.; Long. 73° 15′ 44″ W.

By Prof. E. Emmons, M. D.

Hours of observation.	Barometer.	Attached thermometer.	External thermometer.	Dir. of wind.	Force.	Clouds.	REMARKS.
6 A. M.	29.400	37.5	33.	E	strong	cumu.	Cl's of cumulus kind broke by wind.
7	.420	48.	40.	do	do	.....	do do
8	.436	45.	41.	do	do	do	do do
9	.436	46.	42.	do	do	do	Sun out a few moments occasionally.
10	.450	54.	46.	do	do	.....	Cumulus more broken.
11	.472	53.5	46.5	do	do	cumu.	Clear partially in the zenith for a few [moments.
12	.472	53.	47.	do	.....	.....	
1 P. M.	.452	52.	45.	do	mode.	.....	
2	.446	53.	47.	do	.....	.....	
3	.436	50.	44.	do	rising.	.....	
4	.420	47.5	43.	do	.....	.....	Cl's more broken or fleecy.
5	.411	47.	43.	do	.....	.....	Cl's like mist conceal sum. of moun.
6	.411	59.	46.5	do	.....	.....	Sprinkling.
7	.450	53.	42.	do	mo.st.	.....	Hail, with some drops of rain.
8	.450	48.5	40.	do	do	.....	do
9	.432	48.	48.	do	do	.....	do
10	.416	45.	37.	do	do	.....	Ground white with hail.
11	.400	45.	36.	do	do	.....	
12	.388	44.	38.	do	do	.....	
1 A. M.	.362	44.	38.	do	do	.....	
2	.340	43.	35.	do	strong.	.....	Wind and hail continue.
3	.320	42.	33.	do	do	cumu.	No stars to be seen; hail ceased.
4	.300	43.	34.	do	do	ov.c'st	Some hail.
5	.217	40.	33.	do	do	do	No hail.
6	.217	40.	34.	do	do	do	do
7	.217	49.	41.	do	do	do	do
8	.225	49.5	43.	do	do	do	Misty.
9	.215	49.5	44.	do	do	do	do
10	.215	53.5	48.	do	do	do	Wind, and some hail.
11	.215	50.	48.	do	do	do	Thick cl's in hor., lighter in zenith.
12	.238	52.	46.5	do	do	do	
1 P. M.	.228	52.	48.	do	do	do	Light sprinkling.
2	.228	53.	48.	do	light.	do	do
3	.222	53.	48.	do	do	do	Wet.
4	.212	51.	46.	do	do	do	do clouds breaking in SW.
5	.212	51.	48.	do	do	do	Patches of clear sky in SW.
6	.228	52.	48.	do	strong.	.....	Cumulo stratus in the SW.
Means,	29.340	48.5	42.5				

Obs. made at Prof. Emmon's house; when the bar. stood at 29.350 at the college, it was at 29.238 at Prof. E's.

The instruments were placed in a room in which the window was partially raised; a stove-pipe passing through the room, has probably occasioned the irregularity in the temperature.

The wind commenced blowing from the E between 3 and 4 A. M. of 21st; preceding evening clear. Instruments same as employed by Prof. Hopkins heretofore.

TABLE VIII.

METEOROLOGICAL OBSERVATIONS

Made in the city of New-York, for 37 successive hours, on the 21st and 22d of March, 1837, together with periodical observations made on the 20th and 23d days of the month.

Lat. 40° 42′ 40″ N.; Long. 74° 1′ 8″ W.

By Wm. C. Redfield.

Day & hour of observa.	Barometer.	Attached thermom.	External thermom.	Winds, from,	Strength of winds.	Clouds, from.	REMARKS.
20th, 6 A. M.	30.23	54.	27.	W	moderate.	WNW	Fair.
10	.25	60.	30.	W by S SSE	do	do	Cloudy;
2 P. M.	.17	65.	38.	SSE	do	do	Fair.
6	.13	65.	38.	do	light.	.....	Clear.
10	.20	67.	33.	.....	calm.	.....	do
21st, 6 A. M.	.18	52.	34.	NE by E	moderate.	.....	Cloudy,
7	.19	63.	34.5	do	do	.....	do
8	.20	66.	35.	do	fresh.	.....	do
9	.22	67.	36.5	ENE	do	.....	do
10	.22	64.	37.	do	do	.....	do
11	.22	66.	37.	do	do	.....	do
12	.22	67.	37.5	do	do	.....	do
1 P. M.	.21	69.	38.	NE by E	do	SSW	Sun faintly visible; lower scud cloud moving from SSW.
2	.19	68.	38.	do	strong.	SSw& Ely	Cloudy; scuds from SSW as above, with a still lower stratum of thin scud from the east-
3	.18	68.	37.5	do	do	do	do do do ern quarter.
4	.17	66.	37.	do	do	do	do do do do
5	.18	67.	36.5	do	do	do	do rainy, do commenced raining about 5 P. M. do
6	.17	69.	36.5	do	do	do	Rain.
7	.16	70.	36.	do	fresh.	.....	do
8	.16	70.	36.	do	do	.....	do
9	.16	70.	35.	ENE	strong.	.....	do

The horizon is overcast this morning with a stratum of indistinct snowy cloud, so undefined that its movements or drift cannot be distinguished. The course of the upper cloud is supposed to be the same as on the 20th.

10	.14	70.	36.	do	do	.....	do	
11	.11	69.	35.	do	do	.....	do	
12	.10	70.	35.5	do	do	.....	do	
1 A. M.	.07	71.	35.5	do	do	.....	do	
2	.03	73.	35.5	do	do	.....	do	
3	.00	73.	35.5	do	do	.....	do	
4	29.96	69.	37.5	E	do	.....	do	
5	.94	70.	37.5	do	do	.....	do	
6	.90	70.	37.	do	do	.....	do	
7	.88	70.	37.	do	do	E by N	do	lower rain scud from E by N, moving briskly.
8	.86	70.	37.	E by N	do	E	do	do do E, do heavy rain during night.
9	.86	68.	38.	ENE	do	do	do	do do do
10	.85	69.	42.	E by N	fresh.	ENE	do	do ENE, moderately brisk.
11	.88	71.	38.	NE	do	do	do	do do do rain continues, but falls chiefly in
12	.86	72.	39.	do	do	do	do	do do do [heavy showers since 9 A. M.
1 P. M.	.87	73.	39.	do	do	do	do	
2	.85	72.	38.	NE by E	strong.	do	do	
3	.86	73.	36.	do	gale.	do	do	
4	.86	72.	35.5	do	do	do	do	
5	.87	73.	35.	do	do	do	do	
6	.87	68.	35.	do	strong.	do	do	rain ceased about 8 P. M.
10	.94	72.	35.	do	do	do	Cloudy and rainy.	
23d, 6 A. M.	.90	60.	35.	N NNE	fresh, str.	NNE	Rain.	
10	.95	67.	38.	NNE N	strong.	do	do	
2	30.02	71.	40.	NNE	do	NE	Cloudy and rainy; rain scud continues from NE.	
6	.13	70.	39.	do	fresh.	do NNW	do the upper stratum or current of clouds has been concealed since the 20th by the	
10	.20	71.	38.	NNW NNE	stro., fresh.	NNW	Fair; bright and clear, except in E horizon. [rain and obscurity of the atmosphere.	
Means,	30.05	68.1	36.4					

The barometer is about ten feet above the level of the sea, and its capillarity is allowed for in the adjustment of the instrument. As the period of thirty-seven hours is commonly insufficient for a development of the atmospheric phases which are presented in the United States, the observations of the two contiguous days, made at intervals of four hours, are added from my private journal.

TABLE IX.

METEOROLOGICAL OBSERVATIONS

Made at New-Haven, Ct., for 37 successive hours, commencing 6 A. M. of the 21st March, 1837, and ending 6 P. M. of the following day.

Lat. 41° 17′ 58″ *N.; Long.* 72° 57′ 46″ *W.*

By Edward C. Herrick.

Hours of observation.	Barometer.	Attached thermometer.	External thermometer.	Wind.	Force of wind.	REMARKS.
6 A. M.	30.16	44.	31.	NE by E	light.	Nearly overcast; cls. in W & N
7	.16	44.	34.	ENE	do	Overcast. [hor. very dark.
8	.18	46.	37.	E by N	moderate.	do
9	.20	50.	40.	do	light.	do
10	.21	53.	41.	do	moderate.	do
11	.22	54.	44.	E	do	do
12	.22	55.	45.	do	fresh.	do
1 P. M.	.22	56.	44.5	do	do	do
2	.22	56.	43.	do	do	do
3	.20	57.	41.	do	very fresh.	do
4	.18	58.	41.	do	fresh.	do
5	.18	56.	40.	do	do	do
6	.18	57.	39.5	do	do	do [soon increases.
7	.19	57.	39.	do	moderate.	do beg. to rain gently at 7
8	.20	57.	38.	do	do	do raining moderately.
9	.18	57.	37.5	do	do	do do
10	.17	56.	36.	do	do	do plenteously.
11	.15	56.	37.	do	do	do do
12	.15	56.	37.	not discov.	fresh.	do do
1 A. M.	.13	54.	37.	do	do	do do
2	.09	54.	37.	do	do	do do
3	.07	54.	37.	do	moderate.	do do
4	.05	54.	37.	do	fresh.	do do
5	.03	54.	37.	do	do	do do
6	.01	53.	37.	ENE	moderate.	do do
7	.01	52.	39.	do	do	do moderately.
8	29.97	54.	39.	do	fresh.	do do
9	.96	56.	39.5	do	do	do do
10	.93	56.	41.	do	strong.	do do cls. ENE
11	.91	55.	41.	E by N	violent.	do do do
12	.90	55.	41.	do	do	do do
1 P. M.	.88	56.	41.	do	do	do plenteously.
2	.85	55.	41.	ENE	do	do moderately.
3	.85	55.	41.	do	strong.	do do
4	.87	55.	40.	NE ENE	fresh.	do do
5	.89	56.	39.5	NE by N	do	do do
6	.91	57.	38.	NNE	do	do plenteously.
Means.	30.07	54.3	39.9			

The storm continued from ENE to NNE, with considerable force, until the night of the 23d, during which it broke up. 24th, 7 A. M., barom. 30.18, wind NNE, moderate. Instruments as before. Declination of magnetic needle, 1837, March 25, 6h. 33m. P. M 5° 51′ W.

TABLE X.

METEOROLOGICAL OBSERVATIONS

Made at Gardiner, Me., for 37 successive hours, commencing at 6 A. M. of the 21st of March, 1837, and ending at 6 P. M. of the following day.

By R. H. Gardiner, Esq.

Hours of observation.	Barometer.	Attached thermometer.	External thermometer.	Wind.	Strength of wind.	REMARKS.
6 A. M.	30.24	35.	12.5	calm.	.....	Cir. stratus; clouds from NW.
7	.27	39.	17.5	NNE	light.	do
8	.28	44.	21.	do	do	Overcast.
9	.30	54.	27.	do	do	Cir. and cir. st.
10	.32	55.	30.5	N	do	do
11	.34	56.	39.	NNW	ve. lt.	do
12	.34	54.	40.	do	do	Overcast.
1 P. M.	.34	54.	40.	do	do	do
2	.34	58.	40.	NNE	do	do
3	.32	58.	37.	N	do	Cir. st.; almost clear.
4	.32	61.	35.5	NNW	do	Overcast; a few flakes of snow.
5	.32	61.	34.5	.....	do	Cir. st.; nearly clear.
6	.33	62.	31.5	calm.	.....	do WSW.
7	.32	65.	29.5	do	.....	do
8	.32	65.	28.5	N	ve. lt.	St. overcast; WSW.
9	.33	69.	28.	do	do	do
10	.34	65.	28.	NNW	do	Slightly overcast; a few cir. cls. ro. hor.
11	.34	59.	28.	N	a lit fr.	do do do
12	.34	54.	27.	do	do	do do do
1 A. M.	.30	52.	27.	do	fr. bre.	do do do
2	.30	51.	27.	do	light.	Overcast, but more cls. visible.
3	.28	49.	26.5	do	mod.	do do
4	.26	47.	25.5	do	do	do do
5	.26	46.	25.5	N byE	do	do cls. still denser.
6	.24	47.	25.5	do	do	do a bright spot toward SE.
7	.24	49.	30.	NNE	do	Cls. break. into cir. st. or mackerel sky.
8	.23	52.	31.	do	do	Numerous lt. cls.; principally cir. st.
9	.22	57.	39.	N	light.	do do do
10	.225	62.	41.5	do	do	Nearly clear; a few cumuli from SE.
11	.225	65.	42.5	NNW	mod.	do cir. st.
12	.215	65.	41.5	NE	fresh.	do cir. st. toward S horizon.
1 P. M.	.21	64.	40.	E	do	do do
2	.19	65.	43.5	do	do	Overcast; cls. not dense.
3	.19	67.	43.5	SE	do	Cls. from SE, and more dense.
4	.19	65.	41.	do	do	Overcast; cls. do
5	.186	65.	40.	do	do	do do
6	.18	65.	38.5	do	light.	Drizzle, and slight fog.
Means,	29.726					

Instruments and position same as before.

TABLE XI.

METEOROLOGICAL OBSERVATIONS

Made at Cincinnati, Ohio, for 37 successive hours, commencing at 6 A. M, of the 21st of March, 1837, and ending at 6 P. M. of the following day.

Lat 41° 34′ 43″ N.; Long. 72° 29′ W.

By Prof. JOHN LOCKE, M. D.

Hours of observation.	Barometer corrected.	Attached thermometer.	External thermometer.	Wet bulb.	Winds from.	Strength of wind.	Clouds, from.	An. ve. cl. 10s.	REMARKS.
6 A. M.	29.12	54.	50.	46	SE	.010	.....	..	Cloudy, rainy and foggy.
7	.15	56.	50.	46	do	.012	.....	..	do
8	.13	57.	51.	47	SSE	.012	.....	..	do
9	.13	56.	52.	48	S	.013	.....	..	do
10	.10	56.	52.	49	SSE	.013	.....	..	do
11	.10	56.	54.	49	SE	.013	.....	..	do
12	.09	56.5	54.5	51	do	.014	.....	..	do
1 P. M.	.07	56.5	55.	52	do	.020	SW	6°	Rain, but cls. becoming thin.
2	.05	57.	55.5	52	S	.028	do	6	do
3	.03	57.	55.5	52	WSW	.033	WSW	6	do
4	.03	58.	54.	51	do	.041	.....	6	Cls. still thinner, rain nearly
5	.05	57.	53.	50	W	.220	W	6	do [ceased.
6	.09	56.	52.	49	do	.220	do	..	Rain scarcely perceptible.
7	.11	56.	50.	46	do	.250	do	..	
8	.20	54.	46.	40	WNW	.250	WNW	..	Cloudy, no rain, wind in win-
9	.26	54.	41.	37	NW	.300	.....	..	do [try gusts.
10	.30	54.	41.	37	do	.300	.....	..	do
11	.33	53.	39.	37	WNW	.070	.....	..	do
12	.35	51.5	39.	38	NW	.070	.....	..	Cls. dis. by darker shades on
1 A. M.	.37	50.	38.	36	do	.150	.....	..	do [a light ground.
2	.40	49.	37.	34	do	.200	.....	..	do
3	.40	48.	34.5	32	do	.200	NW	..	do
4	.45	48.	34.5	32	do	.150	do	..	do
5	.45	47.	34.	32	do	.200	do	..	do
6	.46	47.	33.5	31	do	.120	do	..	
7	.50	46.5	33.5	31	do	.120	do	..	No sky visible.
8	.55	46.	34.	32	NNW	.120	NNW	..	Clouds broken; sky visible.
9	.57	47.	40.	34	do	.120	do	3	Sky more extensively do
10	.60	47.	43.	36	do	.120	do	3	
11	.63	54.	48.	40	NW	.10	NW	3	Sky not half cov. with fly. cls.
12	.63	54.	46.	40	N	.07	do	2	Clear; flying clouds.
1 P. M.	.68	56.	48.	40	do	.07	do	2	do
2	.62	56.5	49.	40	NNW	.12	NNW	2	Clear; cls. dissolving rapidly.
3	.62	55.5	49.5	40	NW	.05	NW	2	do
4	.62	54.	49.	40	do	.05	.....	..	Perfectly clear.
5	.62	53.	47.	39	NNW	.07	.....	..	do
6	.62	53.	44.	36	NW	.025	.....	..	do
Means,									

Instruments and position same as in previous observations.

TABLE XII.

METEOROLOGICAL OBSERVATIONS

Made at the University of Vermont, for 37 successive hours, commencing at 6 A. M. of 21st March, 1837, and ending 6 P. M. of the following day.

Lat. 44° 27′ N.; Long. 73° 15′ W.

By Profs. G. W. & F. N. Benedict.

Hours of observation.	Barometer corrected. millim.	Ext. Ther. centigrade.	Dew point. Fahr.	
6 A. M.	754.14	3.	No dew at 15°	
7	754.27	3.5		
8	754.91	6.		
9	755.62	0.		
10	755.46	—1.		
11	755.40	2.		
12	755.20	4.		
1 P. M.	755.20	4.		
2	754.67	3.5	No dew at 20°	
3	754.51	4.		
4	754.06	3.5		
5	754.42	2.		
6	754.47	1.		
7	754.41	1.		
8	754.61	1.		
9	754.57	0.5		
10	754.42	0.		
11	754.28	—0.25		
12	754.06	—0.25		
1 A. M.	753.79	—0.5		
2	753.49	—0.5		
3	753.14	0.		
4	752.84	—0.2		
5	752.69	—0.5		
6	752.54	—0.1		
7	752.44	0.5		
8	752.20	2.3		
9	752.32	5.5	29.5	
10	752.28	8.5	29.	
11	752.25	8.		
12	752.39	7.5		
1 P. M.	752.36	5.75	29.	
2	752·46	5.		
3	752.41	3.		
4	752.56	1.75	29.	
5	752.59	2.5	29.25	
6	752.88	1.25		
Means,	753.684	2°36		

Barom. 29.672 Eng. inches. Therm. 36.25 Fahr

REMARKS TO PRECEDING TABLE

At the time of these observations, the lake was still entirely frozen over, and a succession of cold dry days had immediately preceded them. This will probably account for the very dry state of the air as indicated by the observations with the hygrometer at 6 A. M. and 2 P. M. on the 21st. The wind, very slight, was from the NNW at the beginning, but fluctuating, and from that cause and the aspect of a cloudy sky, a speedy change was anticipated. At 10 A. M. the wind, still slight, was from NW, and at 2 P. M. it had settled in the SE, where it remained till 9 A. M. on the 22d. This change was accompanied with a general thickening of the clouds, and from 9 P. M. on the 21st to 4 A. M. on the 22d, rain, hail and snow occurred, the wind rather fresh than gentle as before, By 9 A. M. on the 22d the wind had veered to S—gentle and steady, where it continued through the time of observation, and for some time after. At 3 P. M. on the 22d a slight irregular rain began again, with a gradual increase of clouds and hazy atmosphere, which extended into the succeeding night. During the whole time the sky was overcast—most of the time entirely so. Had hourly observations been made with the hygrometer, a deposition would probably have been indicated readily as early as 6 or 7 P. M. on the 21st. At the time of making the first hygrometic observation on the 22d, viz. at 9 A. M. the water was dripping freely from the eaves, (from the thawing of a little sleet deposited in the night,) within 2 feet of the instrument. The difference between that observation and the three succeeding ones, is probably chargeable to that circumstance. From the few observations made with the hygrometer no mean is taken.

It is proper to add that the hygrometer, and indeed all the instruments, were placed about 15 ft. above the surface of the ground, and about 285 ft. above the level of Lake Champlain. The column of barometrick heights is corrected, 1st, by subtracting from each reading ,49 mm, to bring it to that of the standard, and 2d, by subtracting from each height so corrected ,000166 of its length for each degree, by which the temperature of the mercury exceeded zero on the centrigrade scale. The scale of the barometer is on its brass case, which is regarded in the above correction.

It is not thought worth while to furnish the noted temperatures of the mercury. They only varied, however, between the extremes, 2°,75 and 5°,1. The hygrometer is Daniell's—made by Newman of London. All the thermometers used are exact instruments, and do not differ in their readings more than a small part of a degree, in like circumstances. Barometer a portable siphon. No. 275, of Bunten of Paris, and requires 49-100 of a millimetre to be subtracted from its readings to bring the heights of the column to those of the Royal Observatory standard. The readings of the instrument give the length between the tangents to the two surfaces—the two legs being of sensibly equal diameter. No correction for capillarity needs to be made.

Art. XIII. *An account of the burning of Schenectady in* 1690, *drawn up from manuscript records. By* George W. Carpenter. *Read February* 6, 1834.

[The historical part of the following Article, embracing the first few pages, and extending to the middle of the year 1689, is taken from Smith's History of the Province of New-York; the subsequent part, containing all the circumstances connected with the event detailed in this paper, is from a book of records on file in the county clerk's office, with the perusal of which I have been politely favored by C. A. Ten Eyck, Esq. I have also examined all the proceedings of the Civil and Military Council of Albany, that are to be found in the Chamberlain's office.]

The early history of our country is intimately blended with that of its aboriginal inhabitants; and while it faithfully records their virtues, and bears honorable testimony to their friendship and kindness, is chequered with their crimes, and marked with a long catalogue of their massacres. Those of Schenectady and Wyoming have long been celebrated for their atrocity and cruelty, and stand in dark relief in the calendar of crime. The former was perpetrated through the instigation of the French in Canada; and this event, which led to the expedition against that country in the ensuing spring, has not been recorded with that minuteness which its importance deserves. I have attempted, therefore, in the following article to give a correct account of it, with the attendant circumstances; together with a succinct history of the colony from its first settlement. This was found necessary, to understand the causes that influenced the French to plan and consummate an act, that will ever be remembered for its unparalleled barbarity.

The province of New-York, at its discovery, was inhabited by a bold and warlike confederacy, consisting of the Mohawks, Oneidas, Onondagas, Senecas and Cayugas. By their undaunted bravery and uniform success in war, they had gained the ascendancy over the surrounding tribes, (who paid them tribute,) and spread their fame over a greater part of the north-

ern continent. The first settlers at Fort-Orange, (now Albany,) early secured their friendship, and entered into a league of amity with them. The Governors of the Province, sensible of the importance of retaining their good will, severally met in council the principal Sachems of the confederacy, ratified the league, and received from them the belt of peace. This friendly intercourse, thus kept alive by the policy of the crown, not only insured to the English a lucrative trade, but protected their settlements from the inroads of the more distant nations.

The French, who settled in Canada in 1603, deprived of the trade with the Iroquois, and not insensible of its advantages, viewed with jealousy, the growing power and wealth of their neighbors, and determined to seduce the Indians from their alliance. To accomplish their malicious purpose, jesuitical emissaries were sent into their country, who finding it impossible to detach them from the interest of the English, endeavored to sow jealousy among them, and thus break up their confederacy and conquer them in detail. So great was the influence which they soon acquired over the minds of some, that the chain of friendship which had bound the Five Nations together from remote antiquity, had well nigh been broken, and the Colony deprived of its most powerful allies. This undoubtedly would have been the result, had not their designs been discovered and counteracted by Peter Schuyler, whose name is identified with the prosperity of the Colony. He was at this time mayor of the city of Albany, and had by his unremitting kindness and disinterested friendship toward the Six Nations, gained their confidence, and thus raised a barrier to the aggressions of the French and the far nations. The confidence reposed in him was so great, that without the consent of their Quidder, (as they called him,) they would neither declare war, make peace, nor enter into any alliance.

The French, disappointed and chagrined at their ill success, furnished the Twightwies and Chictaghicks, (then at war with the Iroquois,) arms and ammunition, encouraging them to harass their borders and cut off their hunting parties. This stratagem also proved abortive, and only served to expose the

deceitfulness of the French. The Confederates detected the treachery, intercepted the supplies, and defeated their enemies. The Governor of Canada, to repair the evil consequences of these measures, and effect a treaty with the Iroquois, formed the bold but rash and impolitic design of invading their territory; for this purpose he collected an army of twenty-six hundred French and Indians, and, commanding in person, entered their country, destroyed their cornfields and burnt several of their villages. This act was an open violation of the peace then existing between the English and French, and soon brought upon the latter the vengeance of the Confederates. Indignant at the treachery, they, with their usual success, made several descents into Canada. The French, unaccustomed to their predatory warfare, could offer but feeble resistance, and thus lost their influence over the far nations; which, with few exceptions, made peace with the English.

In the midst of these successes, and when a little assistance from the English would have proved the total destruction of the French, an event of the greatest importance occurred at New-York, and gave them an opportunity to recover from the chastisements of the Iroquois. Many of the inhabitants had become disaffected to the government, and Leysler, aided by the military, had seized the garrison, and under the cloak of loyalty discharged the duties of governor. He did not meet, however, with that cordial co-operation on the part of the inhabitants which he undoubtedly expected to receive. While some applauded the act and joined his standard, not a few were enraged at his presumption, and considered him in no other light than that of an usurper. The people were thus divided into two distinct parties, who carried their animosity so far that it required all the address of Peter Schuyler to prevent a civil war.

That unity of action which had heretofore enabled them to detect and counteract the designs of their enemies, and which is indispensably necessary to the prosperity of every infant colony, was destroyed, and the borders of their province were exposed to the ravages of the French. Notwithstanding the

late successes of the Confederates, so great was the fear of an invasion from Canada, that on the 28th June, 1689, four scouts were sent from Albany, with directions to proceed to Crown Point, and acquaint the Council from time to time of the movements of the French. The stockadoes around Albany were repaired; and to give the guard an opportunity of observing the enemy in time to sound an alarm, all the fences, wood and houses, that stood without the gates, were removed and taken within the stockadoes. On the first of August, news arrived of a declaration of war between England and France. When these tidings reached the Colony, the disaffection of the inhabitants was so great, that it was found impossible to maintain even a few scouts stationed upon the frontiers. The Civil and Military Council at Albany, not insensible of the importance of their city, and aware of the deep-rooted enmity of the French, immediately *Resolved*, "Since there is news of war between England and France, that the gentlemen now met at this convention, doe each bring a gunn, with $\frac{1}{2}$ lb. of powder and ball equivolent; and that the traders and other inhabitants be pursuaded to doe the same, to make up the number fifty, to be made use of upon occasion."

This timely warning, however, was entirely lost upon the populace; instead of arousing them to a proper sense of their danger, and encouraging them to be prepared to give the French a suitable reception, it only increased their fears, already excited by false reports. The excitement was so great, that many were preparing to emigrate to the east, and the Council found it expedient, on the 7th of August, to issue a proclamation, forbidding any to leave the county of Albany, under the penalty of the law, "to be esteemed, pursued and followed after as cowards, runaways and vagabonds, and as such to be prosecuted by the utmost severity of the law." On the 21st of August, the news of war was confirmed, and information sent to Kinderhook, Schenectady and Canastagione.

The affairs of the French at this time were under the superintendence of Count Frontenac, an accomplished soldier. Although advanced in years, he still retained all the buoyancy

and vivacity of youth, and was well calculated to retrieve the ill successes of his predecessor.

Apprized of the disunion of the English, (through the spies who resided in the colony of New-York,) he did not long remain inactive, but made preparations to carry on the war. Fully sensible of the impossibility of conquering the Iroquois, he avoided the fatal error into which De la Barre and De Nonville had fallen, and by a bold and secret manœuvre, hoped to diminish their confidence in the superiority of the English, and thus open a way for negotiation. He accordingly planned an expedition against Albany. This design did not long remain concealed from the knowledge of the colonists, who received the intelligence from some praying Indians, taken prisoners upon Lake Champlain, (September 1st, 1689.)

A messenger was immediately despatched by the Civil and Military Council of Albany to Ulster, for the aid of thirty men, and an express sent to Capt. Leysler at New-York, to procure an additional one hundred men, and a supply of ammunition. Unable to obtain any aid from New-York, and an attempt to raise by subscription a sum sufficient to maintain one hundred men having entirely failed, (the amount subscribed not exceeding half the sum required,) a deputation was sent to New-England for aid. Although little could have been expected from this quarter, (being engaged at the time in a war with the eastern Indians,) they returned with a promise of assistance. From this time to the latter end of November, the public attention was entirely absorbed in the internal affairs of the colony; and little was done to prevent a surprise, if we except the sending out occasionally of a few scouts. During this period the public credit had sunk so low, that individuals became responsible for the payment of the military. On the 25th of November, the long expected assistance from the east, consisting of eighty-seven men, arrived at Albany. This timely aid, which, under a proper discipline, might have averted the blow which shortly after fell upon Schenectady, only added to the confusion. Thirty of their number were stationed at Schenectady, but instead of meeting a cordial wel-

come on the part of the inhabitants, they were treated with perfect indifference. The disaffection was carried so far, that Peter Schuyler found it necessary to go in person to Schenectady to see them well quartered.

The inhabitants of this place appear to have lost all sense of danger and personal safety. The usual precaution of closing the gates and placing sentinels at the outskirts of the town was neglected, and the inhabitants thus exposed to the marauding parties of the enemy.

When warned of their imminent danger by a small party of gentlemen who had come from Albany for that express purpose, and entreated to keep their outposts manned, they evinced a recklessness of consequences bordering upon idiocy.

While in this exposed condition, the expedition started from Canada, with a view of surprising Albany. It consisted of two hundred French and Indians. Through the advice of the latter, they changed their purpose, and directed their course towards Schenectady, which they reached almost famished, after a march of twenty-two days. They had suffered extremely from the winter, which was uncommonly severe; and during the latter part of their journey, had endured all the torments of hunger. Their provisions were too far expended to return, and they themselves too feeble to encounter a spirited resistance; nothing seemed left them, therefore, but to perish, with the object of their expedition almost accomplished, or to surrender prisoners of war: they chose the latter alternative.

It is impossible at this day to estimate the extremity of their sufferings: *we* are accustomed to judge of the miseries of others, by the standard of our own feelings, and enjoying the comforts of civilized life cannot enter into that degree of hardship and wretchedness necessary to induce the savage, (who rehearses his exploits, with all the ardor of an enthusiast, while enduring the most painful and lingering torments,) to surrender a prisoner of war.

While in this destitute and wretched condition, the Indian scouts, (who were generally two or three days in advance of

all marauding parties,) returned from Schenectady with an account of its defenceless state. This, as might have been expected, buoyed up their depressed hopes and encouraged them to proceed. They reached Schenectady on the 8th of February, 1690, between eleven and twelve o'clock at night. Finding the gates open and the outposts unmanned, they penetrated undiscovered into the very heart of the city.

To prevent any resistance from the inhabitants, and thus secure their total destruction, the whole number of French and Indians was divided into small parties, and each house surrounded without the knowledge of its inmates, who rested in fatal security, not believing it possible for the enemy, in the middle of winter, to march from Canada to their city; nor were they convinced of their error until aroused from their slumber by the savage yell of the Indians, who had already begun the work of destruction. The assailants were rendered desperate by their late sufferings, and with a fiendish barbarity, practised only in savage warfare, commenced an indiscriminate massacre.

The lisping infant was torn from the fond embraces of its frantic mother, and inhumanly murdered in her presence; the aged found in the number of their years no respite from death, but soon fell under the stroke of the tomahawk; nor did the piercing cries of the helpless female move the compassion of the Indian, who beheld in every English countenance an enemy to his race.

To secure the destruction of those who had eluded the tomahawk, the city was fired, and all consumed, with the exception of five or six houses, saved through the intercession of Capt. Sanders,* towards whom they had received particular orders to be kind, in return for the many good offices shewn

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* In Smith's history of New-York, I find the following: "Several women and children were also released at the desire of Captain Glen, to whom the French offered no violence, the officer declaring he had strict orders against it, on the score of his wife's civilities to certain French captives in the time of Colonel Dougan." It will be seen that there is here an error in the name.

by his wife to the French prisoners. The number of those destroyed, amounted to sixty; consisting of

White men,	24
White women,	7
White children,	17
A French prisoner, (girl,)	1
A Macquase Indian,	1
Negroes,	10
Making a total of	60

Among these was Petrus Tassemaker, the minister, and five soldiers from New-England.

Those who escaped the fire and the tomahawk, were fourteen miles from the nearest place of safety: In the hurry of their flight, they could not provide for the dangers that now awaited them, and were exposed to the inclemency of a cold winter's night. Half clad and wounded, they commenced their dreary march towards Albany. Owing to the great depth of snow, (being twenty-four inches at the time,) their progress was very slow, and few reached it before the middle of the next morning. The first that arrived was Symon Schermerhorn;* he had been closely pursued by the enemy, and exposed to their fire had received a wound in his thigh, but by the aid of a good horse, had effected his escape; he reached Albany about five o'clock in the morning, (February 9th, 1690,) and brought information that the enemy had murdered the inhabitants and burnt the city, and were then on their march towards Albany. This error undoubtedly arose from his mistaking the few that followed him out of Schenectady, for the main body, still engaged in the city. Alarm guns were immediately fired at the fort, to apprize the farmers in the vicinity, of danger; the outposts all manned, and every thing put in readiness to repel an attack which was momentarily expected. The statement of Schermerhorn was confirmed by those who arrived during the morning; all of whom reported

* The enemy had murdered his son and three of his negroes.

that the enemy were on their way to Albany. Some horse, sent out to discover their march, were unable to proceed through the deep snow, and obliged to return. The same fate attended an express sent to procure assistance from Sopus. Thus cut off from all communication with their neighbors, the inhabitants awaited the result; nor were they correctly informed of the motions of the enemy, until some time in the afternoon: had they known these early in the morning, they might, in all probability, have surprised them while pillaging the city, and rescued the prisoners afterwards carried to Canada. Some Macquase Indians were sent from Albany in the morning, under the direction of Lawrence, (an Indian very friendly to the English,) to carry the tidings to their castles, and prevail on the Macquase to hasten to their assistance. The bloody scene presented to their sight on their arrival at Schenectady, crowded from their minds the object of their mission, and thus gave the enemy an opportunity to proceed unmolested. Although several messengers were afterwards sent, the Macquase remained wholly unacquainted with the dreadful catastrophe, until too late to be of any real service. The inhabitants of Albany, in the mean time, were preparing to pursue, when they received information that the whole expedition consisted of 1,900 men, 1,700 of whom were destined to Albany: this at once put a stop to the expedition, and prevented any from leaving the city that day.

On the next morning, (February 10th,) six men were despatched to bury the dead, with orders to follow the enemy, provided a sufficient number of friendly Indians could be found at Schenectady to render such a course advisable. These were followed in the afternoon by twenty-five volunteers under Evert de Ridder, (recorder of the city,) and the whole joined by another party on the next day, (February 11th.)

When the third party reached Schenectady, Lawrence, who had been in pursuit since the 9th instant, had just returned with information that the enemy were only two hundred strong: this intelligence gave those collected at Schenectady, for the purpose of rescuing the prisoners, (twenty-seven in

number,) prospects of success. A great fall of rain, however, kept them in the city until the next day, (February 13,) when they were joined by the Mohawks, who had heard of the massacre and come to their assistance. Thus reinforced, they were about leaving in pursuit of the Indians, when they were again hindered by the confession of several Indian prisoners, who affirmed that when they left Canada, six hundred men were preparing to march against New-England or Albany.

While this inactivity prevailed at Schenectady, Lawrence and his Indians, who had left for the second time, kept close in the rear of the enemy: at one time they were within a day's march of them, and would undoubtedly have surprised them, had they not been discovered by some Indians, who were in pursuit of two captive negro boys that had escaped. This induced the French to increase their speed, while their pursuers who had at the commencement performed two days' journey in one, were too much fatigued to overtake them. When arrived at Crown Point, some of the party in pursuit were unable to proceed further, although the enemy were not far in advance. A few, however, continued the pursuit for some distance from the shore, and were only stopped by the smoothness of the ice. The French had foreseen this, and provided themselves with skates and ice-spurs; these, with the horses taken from Schenectady, enabled them to escape from their pursuers, and arrive safe in Canada.

In reviewing the event detailed in this paper, it may not prove uninteresting to search for the causes that led to it.

The French had already made several unsuccessful attempts to draw the Iroquois from their alliance with the English and attach them to their own interest. The opposition always manifested to a treaty with them, was traced to the influence possessed over their minds by the Colonists. This influence, as has already been noticed, was not supported by force, but was the legitimate consequence of an upright course of conduct towards a people possessing a high sense of honor. Thwarted in this attempt, the French had recourse to force of arms, and hoped by a grand display of a large and well dis-

ciplined army, to press them into their service: this not only betrayed a disregard of every principle of justice, but also evinced a total ignorance of the Indian character. The sarcastic and bold reply of the Sachem Garrangula (when threatened with war) to De la Barre, who led the expedition, soon convinced him, that although the Indians were desirous of peace, they would not submit to any humiliating terms to preserve it. Notwithstanding the disastrous results of this expedition, De Nonville, who succeeded De la Barre as governor of Canada, determined to invade the territory of the Iroquois. The great preparations which he made seemed to promise success, but the determined resistance of the Indians discovered to him his error, and ultimately brought upon the French the just retribution of their crimes.

The Indians in their turn became the assailants; and their adversaries soon found they had no common foe to deal with: their progress was marked with desolation and blood, and in one of their descents into Canada, they destroyed one thousand of the inhabitants, besides taking a number of prisoners. This blow was severely felt, and had it been seconded by a spirited assistance from the Colonists, the French, no doubt, would have been driven from Canada. It was at this critical juncture, as has been related, that the disturbance occurred at New-York; this gave them a respite from the vengence of their invaders, and enabled them to recover from the effects of their depredations. All their efforts to subdue the Iroquois had not only proved fruitless, but had always been followed by severe punishment; it became, therefore, a subject of no little importance to the French, *how* the bond of union existing between the English and the Iroquois could be severed: this effected, the rest could be accomplished by the intrigues of the priests. To have made another forcible attempt to break their league with the Colonists, would have evinced a hardihood of purpose little short of madness.

From three Frenchmen, residing at Saratoga, they received intelligence of the disturbance at New-York; and with a cunning that characterized all their intercourse with the English,

determined to send an expedition against Albany. This determination originated, no doubt, in the belief that some signal blow upon the settlements of the English, would convince the Indians of their weakness, and thus bring about an armistice. With this belief they planned the expedition, which resulted in the destruction of Schenectady.

If the Colonists had remained united, there is little reason to believe that the French would have undertaken an expedition which, in all probability, must have resulted in a total discomfiture. Besides, a united effort on the part of the inhabitants, was all that was necessary to defeat the enemy, after they had reached the very gates of Schenectady. There can be no doubt, therefore, but that the expedition arose out of the dissensions of the Colonists; and to Leysler and his partisans must be attributed its fatal consequences.

Art. XIV. Annual Address, *delivered before the Alba ny Institute, April* 1838, *by* James Ferguson, Esq.

Gentlemen:

The history of the last five hundred years exhibits, through a series of events, often extraordinary and portentous, the grand characteristic of a constant and rapid improvement in every species of knowledge. The mind of man seems to have awakened from the dark slumber of the middle ages, as if strengthened by its long though troubled rest, to disdain every limit and throw down every barrier which it had ever acknowledged before. The first century of this period produced the discoveries of gun powder, of the art of printing, and of the new continent; and the commencement of the next was marked by the birth of a new philosophy, by which, in physics, the properties of matter, the laws of motion and of organization were soon to be developed: and in ethics, the true principles of society and the constitution of government determined and defined. About the middle of this important period, lay societies, unconnected either with the civil or ecclesiastical establishments, and intended solely for the encouragement of literature and science, were first organized, and have since been much multiplied in every part of the world—I have therefore thought it not inappropriate in discharging the duty at this time confided to me, to make the subject of this annual exercise a consideration of this last mentioned feature of the modern age. In which I do not mean to wrong the Institute by an historical memoir of the names, founders or eleves of different literary institutions, either in the old world or in the new—but to treat briefly of their general history—of the distinguishing qualities of some of them, and of the influences which they have hitherto exerted,

and may yet be expected to exert upon the literature and science of the time. For the attempt I bespeak your usual forbearance. Nor can the theme, as I think, be deemed by any one unsuited to the occasion, when we reflect that since the revival of letters such societies have identified themselves with the interests of knowledge and of good; and have been the most effectual instruments in ameliorating the condition of our race, by making practical new branches of industry, and improving all the elder departments of science and the arts.

The causes which produced these establishments began to operate about the middle of the fifteenth century. Previous to that time, all learning had been in the hands of the clergy. The seclusion of their lives, and the undisputed authority which they held over the most powerful princes of the time, had enabled them to preserve all the relics of ancient knowledge which had escaped the pillage of the barbarians. They had also improved the leisure of their vocation, and become authors themselves. The monks are our earliest historians—in the monasteries were the first chemical laboratories,* and the sandalled foot, the first trespasser upon the broad, quiet domain of natural science. Nor have their writings, though voluminous, been of little use.† To the Benedictines we are indebted for the treatise on the art of verifying dates, as well as for all we know of the history and language of the northern nations.‡ The gay Froissart describes himself as "priest, canon and treasurer," and Copernicus and Gassendi were both ecclesiastics of high standing.§ But in process of time a barbarous patronage on the one hand, and a false philosophy on the other, had indurated the mildness and ruined the simplicity of the first faith: while the wealth of religious communities had corrupted the order.

At the same time the cruelty of the fierce nobles of the period had driven their vassals to question the hitherto potent charter of divine right. Heresies were in the church,

* See Note 1. † See Note 2. ‡ See Note 3. § See Note 4.

and rebellion in the state, and the world wore an aspect importing danger and discontent, and commotion and change. In such times to investigate any principle or publish any discovery, is certain to procure both denunciation and punishment. The heads of existing establishments will always connect the progress of knowledge with that of innovation, and attribute them to the same cause. The clergy, therefore, from having been the patrons, became the enemies of science; and those of the laity who in any way added to the mass of knowledge, became liable to charges of sorcery and magic, inferring punishments, at the name of which our ears tingle now. Under such circumstances, associations among philosophers became necessary to protect both themselves and their discoveries from the scandal of ignorance and the license of power. These associations were proscribed, and of course necessarily secret—their members being bound to each other by oaths of fearful import. They also availed themselves of the little then known of chemistry and natural magic as a defence against the vulgar, and hence were stigmatized by opprobious epithets, and charged with practising unhallowed mysteries, having for a confederate the devil. There can be but little doubt that such was the original purpose of those fraternities, which at this time, and subsequently, extended themselves, under different names, over the whole of Europe. They were at first societies for mutual protection and the advancement of knowledge, but by preserving only the formal and unnecessary parts of their constitution, came at last to be both useless and dangerous.

Previous to the reformation and dawn of civil liberty, philosophers of different nations held mystic communications with each other by means of these combinations, and in this way new facts and new principles were communicated to those best able to comprehend them. Their knowledge however was held to be private and forbidden, and science in their hands took deservedly the epithet of occult.

But the developements of science at this period were too splendid to admit of concealment. By the aid of the new philosophy, the laws of planetary motion had been discovered, and the investigation of the motive force was in progress. The social fabric had been analyzed and just principles of government established, and men of genius of every nation seem to have arisen at once, and consentaneously to convict error and purify the world.

It was discovered, however, that, while this process had been going on, much had been lost from lack of concert. The same principle had, at the same time, been elaborated by different philosophers, and discoveries had been made of which it was difficult to fix the paternity. These considerations, together with the operation of those natural affinities which men of science have always for each other, produced about the middle of the 17th century the establishment of national academies.* The earliest of these was the Royal Academy of Sciences of France, which commenced its sittings as a private association in 1629, was patronized by Cardinal Richelieu soon after, and established by Royal Edict in 1635. It was remodelled by successive constitutions in 1666 and 1689, under the reign of the same monarch, (Louis XIV,) and patronage of the same minister, and reorganized at the revolution as the National Institute. About the same period originated the Royal Society of London, which, though only chartered in 1660, had held its meetings privately at Oxford, under the style of the Philosophic College, as far back as 1638. Next in order of time were founded the Academia del Cimento of Florence, and the German Academia Naturæ Curiosorum. These four, which may be considered as the germ of modern science, produced soon after the academies of Petersburgh, of Berlin and of Stockholm, among whose associates have been numbered the most distinguished men of their ages. There was no longer any reasons for concealment, when princes became the

* See Note 5.

patrons of science, and its peaceful honors were held more ennobling than those gained either in the forum or the field.

It is a fact deserving notice, that all these associations originated in the immediate neighborhood of universities which were then old, and some of which still survive, though like the heavy gothic structures in which they were located, they now serve only to shew that learning for a long time required to be immured and protected. The meetings at Oxford, of which the peaceful Richard Cromwell was one of the first members, would have been proscribed under the monarchy: and it was urged at Paris, as a main reason for the Academy to accept its first constitution, that they would be otherwise obnoxious to the penalties enacted against unauthorized assemblies, and might under a less wise government be punished and suppressed. We must also remark that the main purpose of these new establishments was the encouragement of science and the new philosophy. There had undoubtedly existed private societies of an older date, both in the universities and among the religious orders, tending to the same end—and the Benedictines and the Jesuits we know were zealous cultivators of science. But these influences were confined and characterized by the more distinct duties of their profession, and were besides liable to a vice of which it is important to be aware. The mere association of learned men, though it give unity of action, correct any habit of thinking peculiar to the individual and increase the mass of knowledge, will yet in time produce an evil much more incurable and dangerous to the object of true philosophy, the spirit of system, by which men come to appropriate principles as they do chattels for the sole reason that they have been to them the object of labor and care, and to defend and propogate them sometimes to the extent of persecution, without considering that new observation and new methods may have already proven them to be false. This is the evil which renders reformation and reorganization neces-

sary to all human institutions, and its effect will be much augmented on such as are destined for scientific objects, when they are connected either with the government, or religion, or public education of a country. For it is the object of all government to keep things as stable and constant as possible, and though we have passed the age when an increase of knowledge can be supposed to threaten the safety of existing establishments, still the spirit of philosophy which is constantly grasping at new truths, suffers and is repressed when connected with institutions whose principles to be efficient must be considered as fixed. The mere object of association could have been attained in the several universities, particularly in the universities of Germany, which had long before the reformation given a character to the public education of their country. But as these were then clerical establishments, and the polemicks of these days not of the most orderly character, they could hardly have offered an adequate remedy to the evil of which we have spoken. It was to be avoided in the organization of national academies by keeping them disconnected from any dominant or militant sect of religion, and as much as possible independent of the government. The vice which rendered the schools and universities of the earlier times unfit agents for the improvement of the sciences, had been many years before distinguished by the illustrious Bacon. And his description of it presents one of the greatest evidences of the clearness, the purity, and the depth of his perceptions. The passage is from the Novum Organum,* and is so characteristic that I shall be excused for quoting it at length: "In the customs and institutions of schools, universities, colleges, and the like conventions, destined for the seats of learned men and the promotion of knowledge, all things are found opposite to the advancement of the sciences; for the readings and exercises are here so managed, that it cannot easily come into any one's mind to think of

* Part I, Sec. 5—90.

things out of the common road. Or if here and there one should venture to use a liberty of judging, he can only impose the task upon himself, without obtaining assistance from his fellows: and if he could dispense with this, he will still find his industry and resolution a great hindrance to the raising of his fortune; for the studies of men in such places are confined and pinned down to the writings of certain authors, from which, if any man happen to differ, he is presently reprehended as a disturber and an innovator. But there is certainly a great difference between arts and sciences and civil affairs: for the danger is not the same from new light as from new commotion. In civil affairs it is true a change even for the better is suspected through fear of disturbance, because these affairs depend upon authority, consent and reputation, and opinion, and not upon demonstration. But arts and sciences should be like mines, resounding on all sides with new works and farther progress; and thus it ought to be according to right reason, but the case is in fact quite otherwise; for the above mentioned administration and policy of schools and universities, generally opposes and greatly prevents the improvement of the sciences."

These opinions of Bacon, so early expressed, and which in their fullest sense, might seem applicable only to the elder institutions, appear nevertheless to have been strongly corroborated nearly in our own times, by Adam Smith, Playfair and Babbage.* The remark of Smith, which being made with more temper than the criticisms of the others, is entitled to more credit, that "the greater part of universities have not been very forward to adopt improvements after they were made: and that several of those learned societies have chosen to remain for a long time the sanctuaries in which exploded systems found shelter and protection, after they had been hunted out of every other corner of the world,"† should be good ground for us to believe that in general much of the old mischief may belong to establishments of more recent

* See Note 6. † Smith's Wealth of Nations, Book 5, Chap. 1.

date. This error was, however, intended to be eradicated in the constitutions of the first free associations, and for that reason only it has been necessary to speak of it now. It is said that the first foundations of this class, those of France, England, Italy and Germany, were based upon the suggestions of Bacon. But of this there is, to say the least, much doubt; and it is much more reasonable to suppose that their first constitutions were determined by the circumstances of the time. The distinguishing quality of the English Academy is its entire independence of the government, or rather this was its distinguishing quality at the period of its birth; and we may suppose this rather to have been the consequence of accident than of any pre-cognition on the part of its first members. Originating during the civil war, and before the nation had approached the eminence of wealth and power to which she subsequently attained, it was not at the time of its foundation, accounted of sufficient importance to have any public function assigned to it, or to hold any relation with, or receive any emolument from the government. Its operations have therefore been similar to those of any other corporation, and its expenses have always been defrayed by subscription. The government have often availed themselves of the science which it embodies, and patronised it by advancing its members to public stations, but other than this it has had no protection or patronage. This peculiarity distinguishes it from all other European societies of its class, and has been the cause, perhaps, why it has operated so powerfully as a regulator and promoter of science throughout the empire. The lectures of Sir Humphrey Davy, on chemistry, are said to have done more for the advancement of that single branch, than all the other instruction of that day.* The want of professors and pensions has been the subject of complaint among the English themselves, while foreigners have in general considered it as an advantage, and lauded the English education as being more practical than that of any other nation. The effect

* See Note 7.

of the Royal Society of London upon the science of the English nation should be of more interest to us, from the circumstance that the constitution of associations for similar purposes, among ourselves, will probably much resemble it, and though recently it has been the subject of much censure, its original operation was altogether beneficial. Containing among its members men distinguished in every department of literature and science, it was little liable to error arising from the spirit of system, while the renown and dignity of its character made always an admission to its body, the highest honor which could be conferred upon men of learning; and even now, if age have impaired its force, and lessened its usefulnes, it has not fallen without rearing about it a progeny of younger associations, originating perhaps in disappointment or in rivalry, but following in freedom of action and discussion, the steps of their distinguished predecessor.—Among them we may notice the British Association, which has now held its seventh annual meeting, and contains near 1900 members.

The other European Academies are of different organization, having salaries and pensions, and holding generally situations of profit in the administration of the government. In this way it may happen that men, distinguished only for the management of affairs, become members without the necessary scientific attainments. Of this arrangement, also, it may be said, that though it place all the science of a nation at its disposal, and enable it better to support the national industry, and to select from its population those citizens best qualified to execute its projects, either in the arts, in commerce, or in war, it yet lies open to the defect alleged against the old universities, a proneness to act from the spirit of system, and bring science, which should be always free and growing, into a fixed and immoveable state. That this has not yet been the case among societies so constituted, has been partly owing to the emulation existing among themselves, partly to the very rapid advancement of sci-

ence, which has kept it unshackled from any arrangement of the schools, and perhaps, also, to the fact, that the honors and emoluments of these institutions have almost always been conferred upon the most learned and deserving, without regard to creed, to business, or to nation. The bounty of Louis the XIV., brought to the French Academy, from Italy, the elder Cassini, and from the Netherlands, Huyghens*—while Cardinal Richelieu, as if to atone for the persecutions which science had recently suffered from the church, compelled Gassendi to come to Paris, and lecture upon what the worthy divine was pleased to call, in his apologetic discourse, "the *profane* science of Geometry." From this period, the French Academy continued to advance in reputation and influence, and contained at the commencement of the revolution a body of talent, such as had scarce ever been collected before. After a suspension of two years, between 1794 and 1796, it revived as the National Institute, and with a constitution differing essentially from that of the Academy. The number of members was augmented to eighty, and divided into departments. That referring to mathematical and physical, holds the old designation of the Academy of Sciences. There is then the Academy of Inscriptions for antiquities; the Academy François, for belles lettres or French literature; the Academy of Arts, and an Academy for the political and moral sciences. The members receive each a pension of fifteen hundred francs, and may, therefore, in virtue of their seats as Academicians, be considered functionaries of the government, of which indeed the institute is a department. Upon its reports are grounded all public operations, concerning the arts and sciences, the national industry and public education. It examines by its committees the treatises of its members, and those intended to be used for instruction, and the present arrangement and dependance of schools, now used in France, was discussed and perfected at one of its earliest sittings. In this way it

* See Note 8.

acts directly upon science, and has hitherto done so with a beneficial influence;—and has been stimulated perhaps to greater exertion, by the revolutions so frequent in France, by the emulation growing out of its foreign connections, and also by its relation to the military science of the country, which since the time of Louis XIV., has been collected in a species of military college at the depot de la Guerre.

The other European Academies resemble this, and differ from the English, in that they are connected with the government, and even still more dependant upon the bounty of their sovereigns, by whose mere authority they have always been created. The distinction, therefore, between the French and English, presents all that can be interesting to us in considering similar establishments among ourselves.

In our own country, though the public instruction be in some cases under supervision, all other societies for the promotion of literature have been entirely free; and if as yet no one of them have arrived at such predominance as to entitle it to the character, or enable it to perform the functions of a National Academy, this has, perhaps, arisen partly from the youth of the nation, which, considering only utility, discredits and discourages abstract science; and may, perhaps, in some degree be attributed to the prevalence of party spirit, which, though it may be necessary to the safety of the government, does by no means tend to the advancement of knowledge. It affords indeed much room for speculation, to think how any institution combining the strength of the science and literature of the whole country, shall first become accredited. Whether the continued rivalry between free associations, shall, in time, produce such excellence in one of them, as to give it preponderance and authority; whether some department of the government, having the management of scientific projects may become virtually invested with the functions of a National Academy: or, whether the government, feeling, in this instance, its duty and interest

coalescing, may not directly or indirectly interfere to establish one: For, whatever may be said of the general diffusion of knowledge and of liberty, it cannot now be argued, that our science will ever be judiciously patronized at home, or represented abroad, until some such power exist among ourselves.* From recent experience we cannot expect the action of the government in favor of general science, for there is no clause in the constitution, which, by the broadest implication, could sanction such an exercise of its authority; and even if such scruple should be avoided, it would only produce the defect of connecting science with government, which, from experience in older countries, has been found not often a wholesome or happy contract. We must therefore regard the first contingency as the most probable, and that the rivalry between free literary associations, is in time destined to produce an excellence which shall be acknowledged by all; and it is therefore of interest to us, as members of a society instituted for the encouragement of literature and science, to regard our affairs in this aspect, and our relations to others of the same class. It were to be insensate and unreasonable to suppose that the same causes which have operated upon other nations, are not to act upon us! When we find streams that do not leave their sources, and men who will neither grow old nor rich, we may perhaps expect the tub of Diogenes again to be occupied; but that the arts, the honors, the excellencies which have strengthened and adorned other states, are not destined to be ours, is a heresy, in which (we would all say with acclamation) we do not believe.

That a National Academy or power, having general authority in matters of science, must soon arise in this country, and that either from the effect of competition among the free literary associations, or from the patronage of the government, is, I think, proven by a single instance, which I will mention. The United States Military Academy,† which was at first a free scientific associ-

* See Note 9. † See Note 10.

ation, (and about the constitutionality of whose endowment there may well be some scruple, though for aught I know it has never yet been weighed) was founded under the superintendance of General Williams, in 1802; and has already had a decided effect even upon the primary education of the country. This Academy was the first to bring into notice the recent authors of France and Germany, in Mathematical and Physical Sciences, and Descriptive Geometry was taught orally to its students by Professor Crozet, as far back as 1817, when the name of that science was scarcely known in the elder seats of learning. At that time, in our colleges and academies, the text books were nearly as old as the time of Newton. Simpson and Bonnycastle, and Maclaurin, and Vince, and Enfield, were *then* the divinities both in pure and mixed mathematics. These have since given place to the better adapted treatises of modern times, and all those who have noticed the progress of this improvement must be aware that the example of the Military Academy, and the increased value of its instruction, contributed in no small degree to hasten the period of this judicious change. This instance may serve to show the effect of government patronage on such subjects.

If we consider merely the effect of competition, the contest in this country will not only be between the free literary associations, but those incorporated for purposes of education, in which the defect incident to the old universities of Europe, does not so much obtain, or will be corrected in the rivalry between them. It would be useless to enumerate all of either class. The American Philosophical Society founded in 1769, has distinguished itself by the extent of its correspondence and consequent value of its collections, and in this has been ably supported by others. Among us, however, these societies have hitherto failed or faded with the genius from which they originally emanated, and the vigor of an association of many individuals seems to have been limited to the life of a single man. Franklin founded the American

Philosophical Society, (I believe when he was a printer.) It is now known more by its library than its transactions. Bowditch sustained, for many years, the American Academy of Massachusetts, and he is dead; and WE who have numbered among our associates, Clinton and Fulton, and Mitchill and De Witt, are not we failing in the obligation consequent to so high a descent. Let it not be so. The boundaries of human knowledge have not yet been franchized, and there are realms before us as wide and as fertile as those which we have left behind.

But setting aside all hope of a National Academy, and supposing that Agrarian notions are to be introduced into the realm of intellect, (which God forbid, for the sublime sciences of Phrenology and Animal Magnetism, would then cease to exist,) let us look at the offices which free literary associations have hitherto performed, and in what way they may be expected to operate upon us.

They have hitherto insured the continual extension of science, which would otherwise have become cramped in the schools. They correct individual habits of thinking. The geometer, the experimenter, the historian, the moralist, the artist and the poet, each of whom individually would treat the same subject differently, according to their respective tastes and occupations, by incorporating in these societies, transfuse their distinguishing qualities to each other, and cover the solid material of science with the graces and beauty of literature and learning. The geometer gives certainty to physics, and prunes the redundant images of false rhetoric—the historian learns to treat events as the philosopher does things—the moralist throws round them all the strong tie of duty and obligation, and the artist gains felicity of device and celerity of execution. It is impossible that bodies so constituted, should ever adopt a rule or limit for any one of their pursuits. The spirit of system can gain no vantage ground here, without falling

"Between the pass and free incensed points of mighty opposites."

Nor is this all, projects are constantly originating, which

affect deeply the manufactures and commerce of nations, and require to mature them, combinations of science and talent both high and rare. There can be no agent more capable to integrate and arrange such attempts, than an association embracing the best accredited knowledge of a country. In the old world National Academies were originally devised, and have always been used for such purposes.

And again, in the progress of science, discoveries are often made, which at first seem of small importance and little value, except that the pleasure of having made them has repaid the philosopher for the time spent in the research. Of such discoveries the world will constantly ask, "What is the use of it?" And the philosopher, if unsupported, might be dismayed at the query, as if his labors, though successful, had been fruitless. But in an association of this class he is sustained by the general alliance of the sciences.* He has discovered, at least, a new truth, made one step in advance of his compeers; and whoever increases knowledge and widens the circuit of thought, though he may not save labor or make bread, has benefitted his race. It has been in the halls of free literary associations that theories have been first elaborated, which were at first beyond the comprehension of the million; but when matured and regulated have brought wealth to nations, new branches of industry to states that had been overpopulated, and delight to men of science throughout the world. Suppose that Lavoisier, when he had discovered oxygen, had been asked by a sans culotte of the Committee of Public Safety, of what *use* his discovery *would* be to the world. The good man would have probably answered, *my* labor has been repaid by the pleasure attending discovery, my ingenuity has been exercised, I can therefore do more, and the world *will* appreciate my *labors*. He could not have foreseen the immense realm which he had been opening to investigation, or the almost numberless classes of industry which were

* See Note 11.

soon to be employed in completing the conquest to which he had pointed the way. In sustaining therefore men of science, when their labors may seem profitless to the vulgar, learned societies perform an office for which there seems no other appointed agent.

There are also other auxiliary functions performed by learned societies, which it is important to notice; and first, it is on the records of these transactions that we must chiefly depend for an accurate history of the progress of science. The history of science considered abstractly is of more value, than we would at first suppose. Nor can perfection be attained in any one department of knowledge, without a proper comprehension of the progress which has brought it to the state in which we find it now. I do not believe, for instance, that a man could be a good watchmaker, who should merely know how to construct the *newest* pendulum or last invented scapement. The art in his hands would be apt to be stationary and unimproveable. To be accomplished in his business he should have traced the successive improvements from the time of Huyghens upwards; understanding well the primitive arrangement and its defects, and how they have gradually disappeared by the application of human labor and ingenuity. Without knowing this he would be apt to go backward instead of forward, superinducing *as improvements* combinations which had been tried and discarded before. In like manner, he might scarce be a good astronomer, who should know merely the state of the science now, even though he had sounded the depths and mastered the transcendencies of Delambre and La Place. Indeed, he would not be very apt to attain such excellence, without having followed the history of astronomy from its origin. The announcement of the true theory by Copernicus; the proof of the first instance by Galileo; the patient labor of Tycho; the sagacious certainty of Kepler; the skill of Huyghens and Cassini, and the far reaching invention of Newton, all succeeded each other in building up the science as it is now, and it

can scarce be understood in its perfection, without understanding the process by which it has been improved. Indeed, in the last treatises upon any science, the first principles which were *proven* till they had become familiar, are at length merely announced as dogmas; the reasoning from which they were derived is forgotten or lost, and can only be supplied by retracing the steps by which it had, in the first instances, been ascertained. As an example of this we may note, that, in nearly all the English Arithmetics, the principle of the Arabic notation, the very base of the science, is not explained at all, though a proper understanding and use of this is said to have first recommended Pestalozzi to the public notice. The use of the principle had made it common, and by common authors its bare annunciation was accounted sufficient. But apart from the aid which a true history of science gives to its disciples, learned societies are of use in preserving chronicles of its progress, and insuring that the origin and manner of any invention shall be as well known as the invention itself. They exhibit, as it were, the crystallizations of thought, and show the modes in which mental effort has been directed to any one point of consideration; and in that way will always prevent the uncertainty which attaches to the works of philosophers of earlier times. We do not know, for instance,* that Descartes had ever read Bacon, and there is some doubt whether he have not appropriated thoughts which originally were not his own. Twenty-five years after the publication of the Optics of Descartes, Dr. Gregory, of St. Andrews, discovered by his own effort, the law of the refraction of light, never having seen the work of the French philosopher in which it had been first demonstrated. The rule called Cardan's rule, for the irreducible case of cubic equations, is said not to have been his invention, though first published by him. And the question, whether Leibnitz or Newton first discovered the principles of the differential calculus, was for many years

* See Note 12.

a source of jealousy and quarrel among the learned men of Europe. Even in our own day, the credit of having succeeded in a difficult experiment in electro-magnetism, made about the same time by our associate, Professor Henry, and Mr. Faraday, has been secured to our countryman, merely from his having announced the results in a communication to the American Philosophical Society. These associations, therefore, by preventing discontent and bickering and jealousy among men of science give a certainty to their labors, and a moral excellence to their characters, which could scarce be attained in any other way.*

Such associations have also much influence in preventing the vicious and demoralizing effects of empyricism and pretence. We are not long in discovering that it does not require much knowledge of a science to be able to *talk* about it: And we have all met men of very plausible but shallow attainment, who have nevertheless held for a long time reputations to which they had but little title. But when men associate, and are actively engaged in scientific or literary pursuits, such dissimulation can be but of short duration. When minds come into contact with each other, the weak always bow to the powerful, nor is there any panoply by which ignorance may be made either defensible or strong. In such combinations therefore, talent always finds its appropriate place, and those who have for any length of time been thus connected, have an acknowledged value entitling them to greater trust, and of course enlarging the sphere of their usefulness. Men thus associated, have also greater individual influence in society than they could otherwise possess; and are enabled to a very great extent to direct applications of industry and of ingenuity, which may chance to fall under their observation. It is, for instance, no uncommon thing, to find imperfectly educated mechanics and artists, wasting time and skill and money upon projects which are either impossible or useless, and which

* See Note 13.

any one having competent knowledge, could easily demonstrate to be so. Such misapplications can always best be corrected, when the science of a nation or a community has been a long time concentrated and acknowledged; and is, of course, properly appreciated and regarded with confidence.

But associations for the encouragement of physical science in particular, are the more necessary in our country, from the nature of the government and character of the public education. It was remarked by the Earl of Chatham, previous to the war of the revolution, and when the measures which produced that event were first agitated in the English Parliament—that the Americans were a nation of lawyers, were of course peculiarly sensitive in matters of right, and snuffed tyranny in every breeze which crossed the Atlantic. This description would answer *nearly* as well for us now as it did then. Those who have reached the highest places in the councils of the nation, have with scarce an exception risen from the profession of the law—a pursuit which, though it imply a knowledge of literature, and some of its concomitants, does by no means encourage or tend to the cultivation of physical science. Indeed it will not be thought unjust in saying that lawyers are more apt than any other class of men to practise upon the maxim that "the proper study of mankind is man," and eschew all material relations and agencies as unworthy their attention. This may not always be the case, but where it is not, will be found to have arisen from some aptitude or bias in the individual, and not from the tendency of his employments. In consequence of this legal character which belongs peculiarly to our statesmen—when scientific projects are entertained by the government, it is long before they are properly understood, and having no national academy or similar establishment, upon whose recommendation the government can rely, they become entangled in the formalities of the departments, in the mazes of party politics, in the jealousies of different branch-

es of the public service, or are confided to the sordid management of contractors and speculators. This defect will only disappear where such projects can be primarily discussed and arranged in an association purely scientific, with whose deliberations pecuniary or party considerations can have no place.

It is also upon the libraries of such societies, that we must chiefly depend for the more rare and valuable works, not only of the past but the present time. And this, *to us*, is of more consequence, inasmuch as our opportunities of procuring relics of primitive learning, become every day more and more unfrequent, and the risk of their being lost in private libraries is always very great. I do not mean to vindicate or recommend the vocation of the mere bibliopole, who estimates the value of his collections by their binding, their date or the width of their margins—though even in this regard, as settling eras in typography, and exhibiting the gradual improvement of the art, such varieties are not without their use. But in a more extended sense, there are productions of the fifteenth and sixteenth centuries which must always be of interest, and which for certainty of arrangement, and purity of diction, have not since been equalled. The works of Copernicus, of Kepler, of Galileo, of Descartes, of Malebranche, of Haller, of Pascal and Montaigne, are rarely to be met with in this country now, and yet there are few who have followed them in their respective departments who have equalled them either in solidity or effect. It was from the perusal of writings of this class that Hume and Smith and Playfair and Stewart and Reid, drew the pabula of learning and habits of investigation which have rendered them celebrated. There seems always in literature and in science, to be a connection between the great of one age and the great of the next. The sceptres of men of genius are never barren or given to a hand unlineal, as the poet's disappointed king complains. Shakespeare gleaned much of the legendary lore of which the ground-work of his happiest conceptions was form-

ed, from the long poems of Chaucer and Gower and others. We may conceive Milton to have been much indebted both to him and to Spenser, and Scott has exhibited as much industry in collating the poetic history and early ballads of his nation, as in giving them back again to the world in the fresher and lighter creations of his own. We know, in the bibliomanie of the times, that single folios have been ground down and melted up into dozens of volumes of the size and character which suit the lighter reading of the present day. In view of this, Doctor Johnson prophesied that the time was fast coming when men would write only duodecimos and paragraphs; while the facetious Sterne exclaimed against fabricating new books as quacks do new medicines, by pouring out of one bottle into another.*

But besides antique or standard productions, there are books even of our own day, which from their size and number can scarce be expected to pass through new editions, and which, if not preserved now, must become rare and difficult of access. It would, for instance, even now, be almost impossible to procure a complete copy of the Transactions of the Royal Society, or of the Academy of Sciences or of the National Institute; while of the Memoirs of the Berlin Academy, there is, I believe, but a single complete copy in the country; yet all these works are of great value and comparatively recent date.

It is also more incumbent on us to collect and preserve the works of the distinguished authors of our own language, from the peculiarly light, and comparatively worthless character of English productions of the present day. The poets, as Scott, Byron, Wordsworth and some other of their cotemporaries, will undoubtedly occupy high and permanent places, and mark an era in the language. But of more useful writing whether relating to history or to moral or physical science, there are not many treatises which may expect to be remembered even for half a century. The public taste seems to have been

* See Note 14.

vitiated by romance, and all the efforts of human ingenuity to have volatilized themselves into fiction. Science has been transmuted into pills, and distilled into extracts so that it is difficult to tell how much either to take or to give. So much as concerns the public instruction is pretended to be taught in two and six penny treatises and pretty nursery fables, while the sanctions of religion and obligations of morality are inculcated and taught, not only to us but the heathen, by tracts of about the same dimension and value.* Writing is now done by the acre, and seems to have no definite purpose but the support of the trade; for it would be utterly impossible for the most ingenious casuist to assign any other object for nine tenths of the productions with which the press at present teems. So far as the mature part of society is concerned, this state of things is bad enough, but considering the interest of the young, it is still worse. It cannot be a judicious system of education to begin with the fancy and leave the reason to mature itself. By such means the judgment becomes discursive, uncertain and unsound; and we lose the ability to profit by our industry or observation. To improve any of our qualities they must be confined and exercised, and not left to run riot through whole worlds at once. As corroborative of this, we notice that under the older systems of education, which, though absurd enough in some things were certainly not deficient in strictness, the growth of both literature and science was not only luxuriant but strong.

This legerity of education and literature also tends to demoralize it. As an instance I will remark that in the time of Johnson, French newspapers were not accounted proper to be read in English families by reason of their levity and the loose character of their descriptions. The tables are turned upon us now, and English newspapers, are in general held discreditable among the French, for reasons which the perusal of many of our public journals will make sufficiently apparent.†

* See Note 15. † See Note 16.

We are therefore led, however reluctantly, to the conclusion that the character of English learning has for some time been gradually loosing weight. Indeed this was almost a necessary consequence after the splendid demonstrations of the last century. Such eras are always followed by an age of imitation, from which we can not expect the bold and strong developements of originality and invention. But in these matters as in every thing human, the downward tendency has always a limit, at which some strong hand arrests and sustains the subject, and gives it an impulse and direction towards new excellence. We may therefore hope that we are now approaching a new era in literature of a higher and more rational character. These remarks will not be deemed invidious. Babbage's reasons for the decay of science in England, though in general characterized by petulance and acerbity, are nevertheless, not groundless, and though a refutation has been attempted, it has not been either satisfactory or triumphant.

If these premises be true, and the expectation of a change for the better be as reasonable as I have supposed, the effect of associations tending to combine science with literature cannot fail to be a most efficient agent in hastening such results. For without discussing the more minute and particular causes alleged for the decay of science in England, such as the exclusive character of the universities, and the inaction and silence of their professorships, we may notice that nearly from the time of Newton a prejudice has been at work in England, whose direct effect must be to disparage science by detracting from its uses, and to emasculate and unnerve literature by washy or trivial subjects. Up to this time, English literature and science had been closely allied; there had till then been no boundary drawn between them, from which the domain of the one was accounted luxuriant and benignant, and that of the other harsh and sterile. The poets till then had remembered the advice of Quintillian, that there is no science or art with which they should

not be familiar,* so Milton was not ashamed to understand astronomy, which knowledge he has in some passages turned to much account. Nor were philosophers unstudious of, or inattentive to, the graces of diction, so Raleigh was a poet. But from that time in our language, these two departments of intellect seem to have been at feud with each other, to their mutual injury. The consequence of this has been, that the literature of the day deals with passion and not with knowledge, and that science is loosing its attractions and becoming repulsive and stern. To show that is not too fanciful a supposition let us notice a few of the exhibitions of this contrariety.

In an English Review of a few years back, which I am not able now to refer to, Professor Playfair is complimented for having been able to write elegantly on an abstruse subject; a compliment which the Professor certainly deserved, but not for the reason that an abstruse subject may not always be clearly explained. We all remember Butler's account of the elephant in the moon, said to have been discovered at one of the first meetings of the Royal Society, a lampoon which proves nothing but the poet's ignorance of the science of optics. The moon story of New-York is still fresh in our recollection, and was upon the whole a much better affair than that got up by the author of Hudibras. But of heavier authors the sarcasms upon science have been just as decidedly pronounced. Gibbon, who devoted some of his earlier years to mathematics and philosophy, congratulates himself that he had escaped from such uncongenial pursuits "*before his mind had been hardened by the habit of rigid demonstration so destructive to the finer* feelings of moral evidence." It is nevertheless, not impossible that Gibbon may have derived some of the piquancy of his style from the early studies of which he speaks so disrespectfully, or that by a more continued application to them his moral susceptibilities might not have been rendered more acute than they were. To be convinced

* See Note 17.

of the deleterious effects of such prejudice, and to what extent it has attained, we have only to refer to the prelude to the first canto of a poem entitled the Loves of the Triangles, and dedicated in ridicule, to Dr. Darwin. This production was on its appearance attributed to no less a genius than that of George Canning, though fortunately for his fame, this ascription is now known not to have been correct, and the paternity of the piece has been assigned to a less distinguished personage. It however serves to show that we are not altogether mistaken when we attribute any deficiency in the literature or science of the present day, to the prejudice by which they have been separated. And we are the better entitled to hope that this incapacity may be removed from the knowledge that a similar state of things existed upon the continent about two centuries since, and that it is not to the same extent to be found there now.

About the time of founding the first independent associations, the literature of the continent and the public taste resembled much what exists now among us. The poets and writers of fiction were in the highest repute, and amused themselves in pasquenading the university and the doctors, who were held as sufficiently unintelligible to be worthy of such notice. But after the academies had reconnected the two departments of knowledge each of them obtained an increased value. In the French particularly, the language acquired a certainty which it had not possessed before, better fitting it for the demonstrations of science, while its increased association produced a fineness and delicacy as much available in the more graceful developements of eloquence and poetry. We can easily conceive that the effect must have been beneficial when Colbert and Cassini and Racine and Bossuet occupied adjoining seats in the new consistory of science, corroborating by union the products of their individual genius. And this consolidation was the base for all the triumphs that followed—from this period ridicule upon science became among French-

men less frequent, and the literature of the nation increased both in mass and in time.

The parallel between these times and our own, is to be sure, not perfectly just. But the effect of the incorporation of literature and science at that time, is felt now, and a new and better growth may arise from a renewal of the connection.

I have thus endeavored to trace the history of free literary associations, and to show their uses in the old world and their probable effects in this. They seem to have arisen with other free institutions, and to a great extent to have contributed to the modifications which the primitive governments of Europe have gradually taken. In France, as I have shown you, they have already become a part of the government itself, nor is it improbable that such may be the final result in our country. They have contributed to sustain the alliance between science and literature, which is too apt to be interrupted, to forward and mature industry, and to benefit our whole race by improving education. If such have been their effect in the old states of the world, we surely are not wrong in supposing that among us it will be similar, and at least as beneficient.

NOTES.

NOTE 1.

"*And the sandalled foot, &c.*"

Shakespeare has made his Friar Laurence not only a gardener and botanist, but also a physician. The Friar was however, not a Thomsonian, as he did not exclude minerals from his practice.

"Oh, mickle is the powerful grace that lies
In herbs, plants, stones and their true qualities,
For nought so vile, that on the earth doth live
But to the earth some special good doth give."

Romeo and Juliet, Act 2, Sc. 3.

NOTE 2.

"*To the Benedictines we are indebted, &c.*"

The monk Nestor wrote Annals of Russia in 1073. The community of St. Maur produced the treatise on the art of verifying dates. The Jesuits and priests of the Oratory also made voluminous collections—the clergy of that day were the keepers of all archives, and masters of diplomacy, and had always with them the material of history. Speaking of the Benedictines, Chateaubriand says, with feeling—"Let us first render a surpassing homage to the school of Benedictines, who can never be replaced—if I were not now a stranger on the soil of my birth—if I had yet a right to propose any one measure, I would venture to solicit the reestablishment of an order to whom literature is so much indebted."

Etudes Historiques, Tome 1, page 26.

NOTE 3.

"*The gay Froissart.*"

Froissart's pastimes would be accounted rather uncanonical at present,—"Well I loved," says he "to see dances and carrolling, well to hear minstrelsy and tales of glee, well to attach myself to them who loved hounds and hawks, &c."

Froissart and his times, by B. St. Leger.

NOTE 4.

"*But in process of time.*"

There are many descriptions of these times, showing what were the real causes of the mis-rule which produced the reformation, and all concur in laying the chief blame upon the monks—the following are from St. Leger's preface to Froissart.

"For as the ascetic virtues of the first cenobites mainly contributed to the establishment of that authority by which the church obtained such extensive dominion, so did the vice and luxury of their successors contribute greatly to the destruction of their power. This likewise became the case in laical governments when the vices and oppressions of the rulers, by straining the cord too tightly broke it, and letting loose the tide of human strength and feeling, gradually led to the abolition of ultra despotism, and to the establishment of national freedom."

* * * * * * * *

"Hence arose that war against letters, those denunciations which characterized science by the name of sorcery, and that determination to punish every one who attempted to enlighten his fellow creatures."

As also Scott—

O aye, the monks, the monks, they did the mischief
Theirs all the grossness, all the superstition
Of a most gross and superstitious age—
May He be praised that sent the healthful tempest,
And scattered all those pestilential vapors—
But that we ow'd them all to yonder harlot,
Thron'd on the seven hills with her cup of gold,
I will as soon believe, with kind Sir Roger
That old Moll White, took wing with cat and broomstick,
And raised the last night's thunder.

Monastery, Chap. 1.

NOTE 5.

The academy of inscriptions now incorporated in the National Institute, is of older date than the academy of sciences; but its duties referred entirely to Archaeology and diplomacy. The English claim that the Royal Society of London, is of older date than the academy of sciences; but this is not probable. We have no account of the meetings of the English society previous to 1638: While the history of the French academy, by M. Pellisson, written in 1729, makes certain the dates of its principal transactions. He says,

"The French academy was not established by edict of the King, till the year 1635, but we may place its actual origin four or five years earlier: and this was the result of accident. Those who speak of the academy of humorists at Rome, say that it commenced fortuitously at the nuptials of Lorenzo Mancini, a gentleman of Rome—where certain persons of condition set themselves about amusing the ladies; and as it was the carnival, began to recite sonnets and comedies, from which they took the name of Belli humori. And in time, having insensibly acquired a taste for such exercises, they resolved to form an academy of Belles lettres."

* * * * * * * *

"The French academy did not in truth, originate from a similar rencontre. But it is certain that those who commenced it thought of nothing less than what has since arrived. About the year 1629, certain individuals belonging in different parts of Paris finding nothing so inconvenient in that great city as to call often upon each other and find no one at home, resolved to meet once a week at the residence of one of them."

These meetings, in the course of a few years, were made known to Cardinal Richelieu, by means of M. Boisrobert, a counsellor of state, who seems to have been a man of genius and of a mirthful and happy temper; two qualities which are not often found together. The Cardinal's physician was used to prescribe for his eminence, when fatigued with the cares of state, a quantum suff. of Boisrobert's conversation. "My lord," he would say, "we will do all that we can for your health, but all our drugs are useless, unless you mix them with a little of Boisrobert." The Cardinal immediately offered to the academicians his protection, a constitution and apartments, which they at first hesitated to accept, but finally did, rather from fear than affection.

Vide Pellison, Histoire de l' Academie Francois.

NOTE 6.

"*Of the defects of the universities there are many coinciding opinions. The following is from Professor Playfair's dissertation.*"

"There are always great numbers of men, who from habit, indolence or fear, are the determined supporters of what is established, whether in practice or opinion. To them the constitutions of the universities of Europe so entirely subjected to the church had added a numerous and learned phalanx, interested to preserve the old systems, and to resist all innovations which would endanger their authority or repose." *Page* 141.

NOTE 7.

"*The want of Professors.*"

Hume complains of this in the following passage—

"Amidst the thick cloud of bigotry and ignorance which overspread the nation during the commonwealth and protectorship, there were a few sedate philosophers who, in the retirement of Oxford, cultivated their reason, and established conferences for the mutual communication of their discoveries in physics and geometry. Wilkins, a clergyman who had married Cromwell's sister, and was afterwards Bishop of Chester, promoted these philosophical conversations. Immediately after the restoration, these men procured a patent, and having enlarged their number, were denominated the *Royal Society*. But this patent was all they obtained from the king—though Charles was a lover of the sciences, particularly chemistry and mechanics, he animated them by his example alone, not by his bounty. His craving courtiers and mistresses, by whom he was perpetually surrounded, engrossed all his expense and left him neither money nor attention for literary merit. His contemporary Lewis, who fell short of the King's genius and knowledge, in this particular, much exceeded him in liberality. Besides pensions conferred on learned men throughout all Europe, his academies were directed by rules, and supported by salaries: a generosity which does great honor to his memory; and in the eyes of all the ingenious part of mankind, will be esteemed an atonement for many of the errors of his reign."

These remarks of Mr. Hume deserve criticism, in as much as they are evidently tinctured with the prejudice towards the Stuarts, which always warped his opinions. He seems here to have forgotten, *both* that the first

meetings of the new society were held at the house of the Protector's brother-in-law, (this I believe was the case, but cannot refer to an authority,) and that under the 1st Charles all such meetings would have been star chamber matters—and he forgets also, that the 2d Charles, though he gave the society a charter, did nothing more. He to be sure, mentions both these circumstances, but does not seem to have connected them consequentially. He had no reason to blame the protectorate for an improvement which would have been punished under the monarchy—and yet he says, "amidst the thick cloud," &c. as if attributing all these evils to Cromwell. There is no sequence in the argument.

NOTE 8.

Gassendi died fifteen years after this compulsory process of Cardinal Richelieu's. His apologetic discourse is given at length, in some book to which I cannot now refer. The fact is mentioned in Stewart's dissertation, page 259; and in the Histoire des Mathematiques par Montucla, Tome 2, page 237.—"The Cardinal Richelieu compelled him in spite of his refusal to accept the chair of a professor royal, which he filled till 1655, which was the year of his death." He was an ecclesiastic of great knowledge, and an exemplary life, indicating in every thing the truth of his faith by the excellence of his practice.

NOTE 9.

It is perhaps, wrong to say that there is no clause in the constitution authorizing the patronage of science; the sections relating to commerce and the currency, might cover such object by implication, but they have been often used before for other purposes, which would weaken their influence now. The only clause in the constitution referring directly to science, is the one regulating the patent office—which is as follows:

"The congress shall have power to promote the progress of science and useful arts, by securing for limited times to authors and inventors, the exclusive right to their respective writings and discoveries."

NOTE 10.

The United States Military Academy, was at first, a free association among the younger officers of the army, for mutual improvement. It was headed by General Williams, and in time received the patronage of the government—it has richly deserved it. The fact of its being a free scientific association is what I wished particularly to refer to, and this is proven by reference to Governor Clinton's discourse at the first meeting of the Literary and Philosophical society of New-York. (Page 21.)

NOTE 11.

Omnes artes qua ad humanitatem pertinent habent quoddam commune vinculum, et quasi cognatione quadam inter se continentur.

Cicero.

Toutes les verites deviennant plus lumineuses les unes par les autres.

Puffendorf.

NOTE 12.

Descartes never once mentions Bacon—though it can scarce be credited that he had not seen his works. The following suggestion of Professor Playfair has more semblance of truth than we could wish. "Descartes paid little attention to those who had gone before him, and, as already remarked, never once mentioned the Archbishop of Spalatro. Like Aristotle, he seems to have formed the design of cutting off the memory of his predecessors; but the invention of printing had made this a far more hopeless undertaking than it was in the days of the Greek philosopher.

Playfair's Dissertation, page 192.

NOTE 13.

The following notice explains the circumstance alluded to.

The principal facts of the paper on the influence of a Spiral conductor were communicated to the American Philosophical Society on the 16th of January, 1835, and an abstract ordered published, as will be seen by the following extract from the March No. of the Franklin Journal.

To the Committee on Publications.

Gentlemen,—The American Philosophical Society, at their last stated meeting, authorized the publication of the following abstract of a verbal communication made to the society by Professor Henry, on the 16th of January last. A memoir on this subject has been since submitted to the society, containing an extension of the subject, the primary fact in relation to which was observed by Professor Henry as early as 1832, and announced by him in the American Journal of Science. Mr. Faraday having recently entered upon a similar train of observations, the immediate publication of the accompanying is important, that the prior claims of our fellow countryman may not be overlooked.

Very respectfully yours,

A. D. Bache,

One of the Secretaries Am. Philos. Soc.

Philadelphia, Feb. 7th, 1835.

NOTE 14.

"Tell me ye learned, shall we forever be adding so much to the bulk and so little to the stock?—Shall we forever make new books, as apothecaries make new mixtures, by pouring only out of one vessel into another? Are we forever to be twisting and untwisting the same rope? for ever in the same track—forever at the same pace? Shall we be destined to the days of eternity, on holydays as well as working days to be shewing the *relics* of learning, as monks do the relics of their saints, without working out one single miracle with them."

Life and Opinions of Tristram Shandy, vol. 4, *ch.* 1.

"On trouve aujourdhui beaucoup d'hommes qui savent ecrire une cinquantaine de pages, et quelquefois un tome (pas trop gros) d'une maniere fort distinguee: mais des hommes, capables de composer et coordonner un ouvrage etendue, d'embrasser un systeme, de le soutenir avec art et interet pendant le cours de plusieurs volumes, il y ên a tres peu: cela demande une force de judiciare, une longueur d'haleine, une abundance de diction, une

faculte d'application, qui diminuent tous les jours. La brochure et l'article de journal semblent etre devenus la mesure et la borne de notre esprit.

Etudes Historiques, Tome 1. *page* 503.

NOTE 15.

This may at first seem strong language, but on reflection I cannot but think it just. The principle of modern education seems to be to learn children to speak of sciences which they do not understand. And the manner in which arithmetic, geography and history are taught in nearly all our schools, deserves unqualified reprehension. In the treatises used on these subjects the memory only is thought of, and the reason not at all, and under this particular regimen there are some children who will never learn. Indeed, it is little matter whether they do or not. I have known some youths of no ordinary intelligence, who if they could have been by any process made deaf and dumb, and sent to institutions where these unfortunates are taught, would have made rapid progress, but who never could learn *any* thing (even spelling,) under the ordinary administration of the stories written for young readers. There are few, leaving out those written by Miss Edgeworth and Miss Sedgwick, that are even tolerable—indeed, if mechanical skill should advance for some time to come, as rapidly as it has done for the twenty years that have past, children will make these studies for themselves; for if there can be any metaphysical application of the principle of the kaleidoscope, (a thing not improbable in the age of Babbage,) and the story of Whittington and his cat, (which is I believe, one of the oldest if not the best of this class of fables,) be subjected to its operation, by which we may vary infinitely, the relations and titles of the personages, as Polonius says, "according to the place and the addition of man and country," all the class of blue, yellow and green books, stories of Lady Bountifuls and Squire Teachums, which make at present the milk of education might be ground out of a simple mechanical contrivance, as Mephistophiles produces the vision which first seduced Faust. We were surprised to find that this kind of fabulous education had been encouraged by Pestalozzi, and that it should be praised by Madame de Stael. The follow is rather laughable.

"Je me rappele dans un roman de Pestalozzi, la restitution de quelques pommes de terre par un enfant qui les avoit volees. Sa grand mere mourante lui ordonne de les reporter au proprietaire du jardin ou il les a prises, et *cette scene attendris jusqu' au fond du cœur*—Ce pauvre crime si l'on peut s'exprimer ainsi, causant de tels remords: la solemnité de la mort a travers les misères de la vie, la viellesse et l'enfance rapprochees par le voix de Dieu, qui parle egalemement a l'une et a l'autre, tout cela fait mal et bien mal, car dans nos fictions poetiques, les pourpres de la destinee soulagent un peu de la pitie que causent les revers; mais l'on croit voir dans ces romans populaires une foible lampe eclairer une petite cabane, et la bonte de l'ame ressort au milieu de toutes les douleurs qui la mettent a l'épreuve."

We can scarce help thinking that if the young robber who stole the potatoes had been flogged soundly after he had eaten them, it would have been a more judicial and judicious treatment than to take them back to the owner, on the death of his grandmother.

NOTE 16.

"*For the fact.*"

That French newspapers were not accounted decent in England, in the time of Doctor Johnson—I cannot give any distinct authority. It is, I think, mentioned in the Rambler, but I have not been able to find the passage. That English newspapers are now not held polite in France, I know merely verbally. An examination of the police reports in the daily papers of New-York, will perhaps explain the reason.

NOTE 17.

The following passage from Milton, shows that he had read both Ptolemy and Descartes.

——"He his fabrick of the heavens
Hath left to their disputes, perhaps to move
His laughter at their quaint opinions made
Hereafter, when they come to model heaven,
And calculate the stars, how they will wield
The mighty frame, how build, unbuild, contrive
To solve appearances: how gird the sphere
With centric and excentric scribbled o'er
Cycle and epicycle, orb in orb."——

This passage is quoted by Professor Playfair to show Milton's acquaintance with Ptolemy. *Dissertation, page* 122.

NOTE 18.

The following is the opening of the first canto of the Loves of the Triangles.

"Stay your rude steps, or e'er your feet invade
The muses' haunts, ye sons of war and trade!
Nor you ye legion friends of church and law,
Pollute those pages with unhallowed paw!
Debased, corrupted, grovelling and confined,
No *Definitions* touch your senseless mind;
To you no *Postulates* prefer their claim,
No ardent *Axioms* your dull souls inflame,
For you no *Tangents* touch, no *Angles* meet
No *Circles* join in oscillations sweet.

For me your *Assoids* round my temples bend
Your wandering curves. Ye conchoids extend:
Let playful Pendules quick vibration feel,
While silent *Cyclois* rests upon her wheel,
Let *Hydrostatics*, simpering as they go
Lead the light Naiads on fantastic toe;
Let shrill *Acoustics* tune the tiny lyre;
With *Euclid* sage fair *Algebra* conspire,
The obedient pully strong *Mechanics* ply
And wanton *Optics* roll the melting eye.

I see the fair fantastic forms appear
The flaunting drapery and the languid leer,
Fair sylphish forms who tall, erect and slim,
Dart the keen glance and stretch the length of limb,
To viewless trappings weave the meanless dance,
Weave the gay wreath and titter as they prance."

To show that this disrelish for science which has been so long felt in England, is not an entire stranger in America, I will refer to the following stanzas from Halleck, one of the sweetest and most talented of our poets.

" There she learned by heart,
Words to the witches in Macbeth unknown—
Hydraulic, hydrostatics and pneumaticks—
Dioptrics, optics, catoptrics, carbon,
Chlorine and iodine and aerostatics;
Also why frogs for want of air expire
And how to set the Tappan sea on fire!

Fanny."

Art. XV. *Eulogium on the Life and Services of* Simeon De Witt, *Surveyor General of the state of New-York, Chancellor of the University, &c. By* T. Romeyn Beck, M. D. *Delivered, by appointment, before the Albany Institute, April* 23, 1835.

Fellow Members of the Institue,

How true is the remark of the moralist that mutability is the lot of man. A short year has only elapsed, since our departed friend was amongst us and took an active interest in our concerns. Now we are assembled, to mourn his loss, to enumerate his services, and to enshrine his virtues in our memory.

I feel myself hardly worthy of conducting your thoughts on this affecting occasion. No one regrets more than myself that the gentleman unanimously selected for this office, was unable to fulfil his engagement.* He would have brought to the task talents, which rank him high in the service of his country, the first dawnings of which were cherished and fostered by the friend he now mourns. I can only follow with unequal steps. Yet an effort however brief, however imperfect, may find some favour, when it attempts to trace and improve the life of a patriot, a scholar and a christian.

Simeon De Witt, our late venerable vice-president, inherited a name of high and rare distinction. In an age fertile of heroes and great men, amidst wars and tumults, in contest with England under Cromwell, with France under Louis XIV., the immortal John De Witt maintained the honor and glory of his native land, developed its resources, extended its commerce and gave it

*James Ferguson, Esq., formerly American Astronomer in adjusting the North Western Boundary—now engaged in the national work of a Survey of our Coast.

a place among the ruling powers of the earth. Yet he fell a victim to popular fury, and his death was a foul stain on the republic which he had governed with so much energy and patriotism.

From that country the ancestor of Mr. De Witt emigrated, probably some years previous to the period just noticed. He was among the early Dutch occupants of the then colony of the New-Netherlands—now our own state of New-York. The family appear to have settled in Ulster county, and here, in the town of Wawarsing, on the 25th of December 1756, Mr. De Witt was born. His father was Dr. Andrew De Witt, a respectable and intelligent physician, and his mother a Miss Vernoy, of an emigrant Huguenot family in the same county.

At this early period in our history, the means of education were but scantily diffused, yet it is a mistaken idea to suppose that they were altogether deficient. Private in-instruction in many instances supplied the want of public institutions, and the clergy, as in other countries, were efficient agents in preserving and transmitting the living lights of learning. After having received such an English education as the means of a scattered agricultural population could afford, he was placed with the minister of the town, and an intimate friend of his father, the late Rev. Dr. Romeyn, of Schenectady, for the purpose of classical instruction. Here he was prepared for college, and in due season entered Queens (now Rutgers') in New-Jersey, under the presidency of the late Rev. Dr. Hardenbergh.

He was not however destined to complete the prescribed course in quiet academic shades. The stirring times of our revolutionary conflict were at hand. Great Britain, not deterred by the determined spirit that manifested itself at Lexington and Bunker-Hill, sent army after army to conquer her rebellious colonies, and the contest threatened to be long and bloody. The battle of Long-Island was followed by the evacuation of New-York and the unwilling departure of the American army

across the Hudson. It was not permitted to retreat unmolested. General Howe pursued the flying Americans to New-York and from that to New-Brunswick, and again from New-Brunswick to Princeton and Trenton, where his tide of success was suddenly checked by the bold achievement of our great captain.

Ere this, however, the college had been burned by the British troops, and the students dispersed. This was either at the close of Mr. De Witt's junior or the commencement of his senior year, and he must have been at this time nearly twenty years of age.*

He returned to his native home, pursued his studies as he found opportunity, and passed much of his time in the family of his uncle, General James Clinton, then a colonel in the revolutionary army, and father of De Witt Clinton.

With Gen. Clinton and his brother, Governor George Clinton, he was a great favorite. From them and from his father, he could not fail inspiring the principles of true patriotism. During the next year, the formidable incursion of Burgoyne roused all the military spirit of the state. A battalion was organized in Ulster county to join the American army under General Gates, and with this Mr. De Witt marched as volunteer adjutant. On arriving at the seat of war the men were incorporated into a regiment already existing, and being thus deprived of his temporary command, he fell into the ranks as a private, and in this capacity was present at the battles which decided the fate of Burgoyne, and at his subsequent surrender.

The service being ended, for which he and his companions had volunteered, he again returned to his father's house. He pursued his mathematical studies, combining with these, an attention to the practical business of surveying. Not many months, however, had elapsed, before General Washington, in a letter to Ge-

* He received the degree of A. B. from Queens College in 1776, and of A. M. in 1788.

neral James Clinton, enquired whether he knew of any person who was qualified to act as Geographer, or, as it would now probably be termed, Topographical Engineer, to the army. Mr. De Witt was immediately recommended by him, and he was accordingly appointed in 1778, assistant to Col. Robert Erskine, then Geographer in chief. How well and how satisfactorily he performed his duties, may be inferred from the fact, that on the death of Col. Erskine in 1780, (and not his resignation as has been erroneously stated in some accounts,*) he was appointed head of the department. The commission under which he served I have here before me, and you will permit me to read it as a relic of by-gone times.

The United States of America, in Congress assembled.

To Simeon De Witt, Esq. *Greeting.*

We, reposing especial trust and confidence in your patriotism, prudence and fidelity, do by these presents appoint you to be Geographer to the United States of America from the fourth day of December, 1780. You are therefore faithfully and diligently to discharge the duty of Geographer to the United States of America, by doing and performing all manner of things thereunto belonging. And you are to observe and follow such orders and directions from time to time as you shall receive from this or a future Congress of the United States, or committee of Congress for that purpose appointed, a committee of the states, or the commander in chief, for the time being, of the army of the United States, according to the rules and discipline of war, in pursuance of the trust reposed in you. This commission to continue in force until revoked by this or a future Congress, the committee of Congress before mentioned, or a committee of the states.

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* In Congress, Dec. 4, 1780, Resolved, That Simeon De Witt be appointed Geographer to the Army in the room of Robert Erskine, deceased. Extract from the minutes. Charles Thomson, Secretary. [From the original now in my possession.]

Witness his excellency, Thomas M'Kean, Esqr., President of the Congress of the United States of America, at Philadelphia, the eighth day of September, and in the sixth year of our independence.

THOMAS M'KEAN, *President.*

On the 16th December, 1780, he was ordered to head quarters at New-Windsor, by General Washington, and continued attached to the main army until the end of the campaign. In the memorable march to York-Town, he, with his assistants, was constantly employed in surveying the country along the route of the army, and was present during its siege, and at its surrender. Thus, "*having had the signal good fortune to witness the surrender of the two royal armies of Burgoyne and Cornwallis.*"

The war, as is well known, lingered for a year or two after this, and as the prospect of peace brightened, he became anxious to receive a discharge. On application to General Washington, however, he was answered that his office was such, that Congress might possibly still have occasion for his services, and he, therefore, did not conceive himself authorized to grant it. At the same time Mr. De Witt proposed a publication, the failure of which cannot be too much regretted. I will use his own language in addressing General Washington.

"Since the army is now about being disbanded, and as I suppose the public will stand no further in need of my services, and consequently include me among the number of those who receive their final dismission, I therefore ask from your excellency the last favor of a discharge, and beg the acceptance of my sincerest acknowledgements for the honor I have had of serving under your excellency's particular direction. All I regret is, that the poverty of my country and myself have not permitted me to make my office more extensively useful.

"I made application last summer to congress for permission to prepare the maps in my possession for publication. To a committee appointed on the business, I pointed out their usefulness; that, though no direct ad-

vantages would result to the public, every light that could be thrown upon the transactions of the war was due, not only to the solicitude which every individual has for his country, but more particularly to the merits of our principal commanders, whose proceedings in all these particulars have hitherto been, and will continue to be pried into, with the greatest eagerness, in every part of the globe. I represented that in every civilized nation, where circumstances prevented the progress of the liberal arts, it had been the business of government to lend every encouragement. That in the present case, the inundation of catchpenny maps, which, upon the commencement of peace would probably be poured upon us from Europe, and which can there be executed with a facility that must discourage every attempt of the kind in this part of the world, would render such an undertaking too precarious for me to venture upon, at my own risque. That all I desired was to be assisted in going through the business and indemnified in the end.

"The remarks on the opposite side were that the state of our finances was in so low a condition, that the strict economy they were obliged to observe, forbade the application of money to any thing but the numerous necessities which urged their immediate relief. That this was not an affair which claimed a primary regard, and therefore it was not very probable that congress would second the proposals I made."

In a subsequent communication to the president of congress, dated Jan. 12, 1784, he observes, "If the expense of bringing my maps to a farther degree of perfection by additional survey, be judged to be needless, I have this proposal to make. I will undertake, in the best manner I can from the materials I have, as much as shall be conveniently contained in one plate, and publish it at my own risque, provided I am furnished from the continental treasury with cash sufficient for the purpose, on account of the pay now due me from the United States. Probably a thousand dollars will be suffi-

cient. I make this stipulation with the greater assurance, as I have not had the indulgence extended to me by which others of the army, who, like myself, have not been patronized by any particular state, have received on the settlement of their depreciation accounts, considerable proportions of the balances due them. From the impressions of one plate, I shall be able to judge, whether it shall afterwards answer to undertake any more at present."

The reply of General Washington to this application is taken from an autograph now in the possession of this society. It is as follows:

Mount Vernon, 3*d March*, 1784.

Dear Sir—By the interruption of the post, your letter, dated the 12th of January, never got to my hands until Sunday last.

I have urged, not only in public, but in private conversations with individual members of congress, the propriety, indeed necessity, of having accurate maps of the United States, and they know full well my opinion of your worth, and ability to execute them. All seem sensible of these, and yet, the want of funds, I suppose, stops this, as it does many other wheels which ought to be moving.

The propositions contained in your memorial of the 12th, to congress, appear to me exceedingly reasonable and just. These sentiments I will express to a very valuable and respected member of that body, to whom I am now writing. With great esteem,

I am, dear sir,

Your most obedient servant,

GEORGE WASHINGTON.

Simeon De Witt, Esq.

The disordered state of the national finances discouraged this laudable plan, and it was reserved for later times to present these illustrations of the heroism and sufferings of our forefathers. In the prospect of leav-

ing the army, Mr. De Witt turned his attention to the application of his talents and knowledge to surveying the vast unsettled territory that now lay ready to be occupied by the enterprising. "If a new state (says he,) is to be laid off adjoining Pennsylvania and Virginia as has been expected, I have hopes that from the parity of the office I now hold, and that of surveyor general to such a state, congress will be inclined to transfer me to that department, especially if it be allowable to suppose them influenced by a predeliction in favor of their old servants, who have done their duty with reputation under all the difficulties which the American army had to encounter, and who have lost permanent places of employment by being engaged in a military life."

In less than three months from the date of this letter, and in consequence of the resignation of General Philip Schuyler, he was gratified in receiving the information that he had been appointed Surveyor-General of this, his native state. His commission is dated on the 13th day of May, 1784—I need hardly add, that he held it more than fifty years.

Although New-York was for some years subsequent, the political capital of the state, yet the Surveyor-General's office was by law established in this city, and here accordingly he removed as early as practicable. In the then condition of our state, his duties were numerous and unremitted. The western section was still a forest. It was to be prepared for the residence of civilization, of refinement and of learning. In traversing its extensive domain, he could not fail to appreciate its manifold and vast capabilities—its fruitful soil—its abundant streams—its exhaustless mineral riches. Yet, to his high and lasting honor be it spoken, that none of these things moved him from his integrity. He ever desired to avoid aught that could breathe on the purity of his character as a public officer. I state it with pride, as one of the brightest traits in his character, that during the half cen-

tury of his public life, he never purchased a single acre of the public lands.*

The boundary lines between the respective states were generally unsettled, at this period of time, but as property constantly became more valuable, and the danger of conflicts in territorial jurisdiction increased, a general desire was entertained to establish them permanently. One of these was the line between this state and Pennsylvania. Commissioners were appointed by each. On the part of the last, were Rittenhouse, of European celebrity, and Ellicott, an excellent astronomer and mathematician, while from this state were selected Philip Schuyler, James Clinton and Simeon De Witt. The two last only attended to the duties of the appointment. The survey was completed in the years 1786 and 1787, in a satisfactory manner.

Are there any gentlemen present who are now residents of the southern portion of our state along the line

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* Pure as he confessedly was on this subject, his supposed conduct on another point has been made the subject of attack with the formidable weapon of ridicule. I refer to the application of classical names to the newly erected towns in the military tract. Whatever opinion we may entertain respecting the taste of this domestication of Greek and Latin worthies, it is sufficient for me to deny, that Mr. De Witt had aught to do with it, and that he was not the "*Godfather of the christened West.*" This line formed part of a poetical effusion, that appeared in New-York in 1819. He does not appear to have noticed it, but when the charge was repeated some years after in dull prose, by an editor in New-York, he published a satisfactory refutation in the following terms:

"The editor of the ——— has done the Surveyor-General much honor, by retaining for him the naming of the townships in the military tract, *for a display of his knowledge.* The names of these townships, of the ten townships along the St. Lawrence, and of the townships along the Susquehannah river in the vicinity of Pennsylvania, were given by formal resolutions of the Commissioners of the Land-Office. The board then consisting of the Governor, the Secretary of State, the Treasurer, the Auditor, and the Attorney-General, held its meetings in the city of New-York. The Surveyor-General had his office established by law in the city of Albany, and knew nothing of these *obnoxious* names, till they were officially communicated to him, nor had he ever any agency in suggesting any of them."

Let not then this charge be again brought against him, as through ignorance alone I have even heard it since his death.

in question, or are there any who have recently visited it? If so, it may gratify them to hear a brief description of the country, by the memorable Rittenhouse at that time.

In a letter to his wife, dated August, 1786, he says,— "It is six long weeks since I have had the happiness of seeing you or hearing from you, and this is the first opportunity I have had of conveying a letter to you since I left Wyoming. As I cannot hope to receive a line from you until we approach nearer to the habitable world, my next greatest pleasure is to inform you of the favorable state of my health. This seems a different climate from that you are in; the weather is constantly cool, but not cold. We are at present situated on a pleasant bank of the Susquehannah, about fifteen miles above the mouth of the Chenango, one of the principal branches of this river. From this place to Middletown in Lancaster county, is by estimation, 270 miles along the river; much of the road is very bad, so that we had a tedious journey. At Chenango there are a few Indian families settled, amounting to forty souls. Some of these people frequently visit us and bring us fish and venison; in return for which they are very desirous to have flour or salted provisions, and we live in the greatest harmony with them. Five or six days ago, one of the Onondaga sachems, with his family, came up in three canoes, and encamped in the evening, just below us. General Clinton having prudently brought an interpreter with him, we are enabled to converse, as, although cheerful and agreeable, they cannot or will not speak a word of English." He then adds, that Mr. De Witt was taking a likeness of the daughter of the sachem, which he hoped to have the pleasure to show her in a few weeks.

Thus, in a tent for their only shelter during several months, were these gentlemen engaged in this then uncultivated region, in assigning the metes and bounds of the respective republics.

It is unnecessary for me to dwell on the routine duties of the office he was now holding. They were laborious

from the quantity of land held by the state and the details necessarily needed when any alienation of it was directed.

As early as 1786, the legislature had requested his attention to the preparation of a map of New-York, and this, after combining his own surveys and those of gentlemen associated with him, or acting under him, he was enabled to complete, and afterwards to publish in 1802. Its execution was creditable to all concerned, and amidst the rapid changes that industry and enterprize are inducing in every quarter, it may now be referred to, as an index of what we then were.*

Were it not for some land-marks like this, posterity would hardly credit our rapid advance. The forest changed to a city, the sequestered stream rushing over its rocky bed, becoming the abode of manufacturing industry—the school house—the academy—the college, erected near the scarcely tenantless wigwam, are only feeble illustrations of our onward march.

Within the period that I last noticed, the government of the United States had gone into successful operation under the presidency of General Washington. In the appointments to office made by that great man, it is the remark of his biographer, that without regard to private friendship, he looked solely to the qualifications of the individual. And the history of his administration undoubtedly warrants this assertion. If there was any partiality, it was towards his companions in arms; men who had fought by his side, endured all the privations of our revolutionary war, and whose country, at its conclusion, was too poor to reward them according to their merits. That he should select such, was only paying the debt long since incurred. Yet he made his choice with judgment, and an ever steady eye to the welfare and benefit of the country. Mr. De Witt was one of those who were not forgotten.

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* The Map was engraved by Fairman, and was one of his earliest productions.

In 1796, General Washington, without his knowledge or solicitation, nominated him to the Senate as Surveyor-General to the United States, and the appointment was cordially ratified. This event was often spoken of by Mr. De Witt to his intimate friends, as the most gratifying in his public life, and as age advanced, he appeared to prize it more highly. Well might he do so—it is an honor higher than a patent of nobility, to have attained the confidence of Washington. Let all who can number it among their ancestral memorials, value it as a jewel of great price.

This appointment, however flattering to his feelings, he was induced, from the force of circumstances, to decline. In his letter to Col. Pickering, then Secretary of State, he says, "I pray you to express to the President how much I am impressed with the sense of being favored with this mark of his confidence, and to assure him that nothing but an apprehension of making too great a sacrifice could have prevailed on me not to accept the office."

In 1798, he was elected a Regent of the University in the room of the Hon. Lewis Morris, deceased. This office he held until his death, and for many years was the senior member of the board. In 1817, he was elected Vice-Chancellor, and in 1829, on the death of Lieutenant-Governor Tayler, a friend of his early and his later days, he was chosen Chancellor of the University. The present is not the time and, in some respects, it is not the place to discuss the services of this board in the cause of learning and education throughout our state. What I have to remark, will be altogether historically.

It was conceived, just half a century since, (1785,) by our then legislature, that instead of leaving the subject of education to the frequently immature, as well as discordant plans of a body of men coming together for only a short time, and especially engaged in local affairs; it would be well to select a number of intelligent and enlightened individuals and commit this great cause to

their fostering care. Men were found who entered on it with ardor and alacrity. Not many years after their appointment, I have seen on their minutes, repeated notices of the subject of Common Schools, and they earnestly solicited the legislature to give them that stability and increase which our subsequent School Fund has been the means of accomplishing. In the establishment of Colleges and Academies, they looked to the endowment that was bestowed. They understood not the doctrine of political economy, that literary institutions will flourish most, when altogether dependent on temporary and fluctuating support. It is well stated by Dr. Chalmers, and did I not fear to appear arrogant, I would say, conclusively argued by him, that there are some institutions in every enlightened country which cannot be safely left unprotected.* The intelligent may and do see the want of education; they understand perfectly, that each endowment is more for the benefit of those in middling circumstances, and the poor, than for the rich; and they are aware, as all must be, who look at the subject, that education will be neglected, if the state does not interfere to nourish it, to raise its standard, and to encourage its servants.

With such views, in advance at every step of existing establishments of education, we may point to the labors of many members of the board. Among general objects to be effected through the medium of the institutions of which he was a governor, there were two, on which Mr. De Witt had long pondered, and both of which he succeeded within the last ten years in maturing. One was to require from every academy a series of meteorological observations, including the temperature, the quantity of rain, the progress of vegetation, and indeed a notice of all the phenomena that constitute peculiarity of climate. No field could be better calculated for enquiry. Extending over four degress of latitude and seven of longitude, and reaching from the Atlantic to the lakes, our

* See Chalmers on Endowments.

state presents a noble area for the solution of problems connected with the varied meteorology of temperate regions. The directions for this extensive undertaking were prepared by Mr. De Witt.

Among the interesting results already obtained, directly applicable to our numerous works of internal improvement, is the approximation to the actual quantity of rain and snow that fall in various situations, and the effect of altitude or of clearing forests, on this. Among the higher scientific results, are the deductions to be hereafter made from the simultaneous appearance of the Aurora Borealis in the northern latitudes of Europe, and in this state. Observers in Great Britain are already noticing, with great solicitude, this striking occurrence.

To another subject, Mr. De Witt devoted equal attention. This was the variation of the magnetic needle. In a report to the Board of Regents, it was stated, "that it was very desirable that observations should be annually made on this, in as much as the boundaries of lands are usually described according to the courses indicated by the needle, and there are no rules by which its variations can be ascertained, for any interval of time, according to which such bounds may be retraced where the land-marks have been obliterated." As, however, the Regents could not make the duty of observing imperative, it was resolved that they would recommend the same, and for this purpose a series of directions were drawn up by Mr. De Witt. Several of the institutions have complied with the request, and there is no doubt, but that as they acquire proper instruments, all will attend to it.

In connexion with the subject of education, I must not omit his long services as a Trustee of the Lancaster School Society, of which, at his death, he was President.

On the inception of the canal policy of this state, Mr. De Witt was directed officially to cause surveys to be

made of the streams and rivers between the Hudson and lake Erie, and for several years, he was associated as one of the Board of Canal Commissioners.

From the account I have now given of his official acts, an idea will readily be formed of the peculiar bent of his mind on literary and scientific subjects. It would, however, be altogether imperfect, were I to omit a sketch of his connexion with societies intended to promote and advance these.

Questionable as their utility may appear to some in these days of universal doubt and disputation, I would yet suggest that in this country, much room is left for displaying all their valuable traits. We differ in many respects from scientific Europe. Our means of investigation are limited and partial. Our men of science are scattered over the surface of a large country, and can scarcely pursue its progress, except through the medium of journals and societies. That we have abundance of talent, is an every day's observation, but we are hardly aware how much of it is wasted in oft-repeated enquiries, and how frequently it is depressed by finding the product of years of labor, useless and superfluous. Those who have seen (as several in this society have witnessed) the inventor presenting his supposed novelty, with a feeling of hardly suppressed pride, as an offering, not only to science, but also with an impression that through it he will be repaid for months and years of reflection and enquiry, and then behold his depression, when in some scientific work, all that he had thought and labored, is already put down, will scarcely deny that the collision of mind must be of immense service. It is indeed thus that societies prove infinitely useful. For the successful pursuit of natural history they are indispensable. Nor is the meeting together without its utility in fostering the social virtues.

The oldest society in the United States is the "American Philosophical," established at Philadelphia. Of this, Franklin was the first President, and Rittenhouse,

the second, and Mr. De Witt was elected a member, at least as early as 1790, on the recommendation of the latter gentleman. He made one communication to the society, entitled "Observations on the Eclipse of the Sun, June 16, 1806, at Albany." It is published in the 6th vol. of their Transactions.

Philadelphia and Boston alone had philosophical societies, when one was incorporated in this state in 1793, under the name of the "Society for the Promotion of Agriculture, Arts, and Manufactures." Of this, Mr. De Witt was an original member, he served in various offices, and on the death of Chancellor Livingston, its first and only President from 1791 to 1813, he succeeded him in the chair. To this body he communicated several papers: two of them deserve particular notice, since the thoughts contained in them were, as you will observe, matured for practical purposes. I refer to communications "on a plan of a Meteorological Chart, for exhibiting a comparative view of the Climates of North America, and the progress of Vegetation," and "on the establishment of a Meridian Line on the public square in the city of Albany." Besides these, he read several on Drawing in Perspective, and his observations on this important branch of study, were afterwards enlarged and published in a volume, entitled "THE ELEMENTS OF PERSPECTIVE." On Agricultural subjects, he communicated concerning the extirpation of the Canada Thistle, and a method of procuring new varieties of the Potatoe; while as to the arts and natural science, may be mentioned his papers on Heating Rooms, on the Forest Trees of this country, and on a remarkable cold Spring at Ithaca.

In 1799 he delivered the Annual Address before the society. Its subject was the improvement of Agriculture, and he noticed with much earnestness the then comparatively novel ideas of rotation of crops, and of the introduction of various kinds of grain. In the conclusion, he adduces an illustration of the deep hold that agricul-

tural pursuits exercise over the mind, in the fact that the elysium of the Pagan Mythology, and the heaven of Mohammed, owe much of their attractiveness to the deep arched bowers and landscapes which they are promised to contain. The idea is at least poetical, and I am greatly mistaken if it has not been used with effect by some modern poet.

On the establishment of the Board of Agriculture by the legislature, the society for the promotion of useful arts, became a city institution. It possessed a small but valuable library, and many of its members were unwilling that this should be dispersed and the society abandoned. It was thought that a union with the Lyceum of Natural History, and the extension of the objects of the society, so as to comprehend general literature, might be useful to all engaged, and, if properly sustained, honorable to the city. Of this plan, Mr. De Witt was a warm and zealous supporter. I need hardly add, that it ended in the incorporation of the ALBANY INSTITUTE. I rejoice that he lived long enough to be satisfied that his anticipations had proved successful. For this, he labored as much as any of his associates, by his attendance, his communications and his donations. Even since his death, in our last published list of donations, we witness his friendship to us, and his remembrance of the institution he so much cherished.

His published communications in the Transactions of the Institute, are a table of variations of the Magnetic Needle; observations on the functions of the Moon, deduced from observations made on the great eclipse in 1806; and an account of a new form of Rain Gage.

While on the subject of his writings, I may add, that he made several communications to Professor Silliman's Journal, and particularly was much interested during the commencement of 1834, in discussing the theory of the remarkable Meteors, or falling stars, of November, 1833. A publication of his, on this subject, appeared in the Argus newspaper of this city.

Of his unpublished papers, probably the one of greatest interest is that on the Theory of Music. He had long attended to this science, and indeed invented an instrument to illustrate the ideas that he entertained.

It is evident from the detail now before you, that his habits must have been those of study and reflection. This indeed was the prevailing bent of his mind, and he delighted to cultivate it. With his time divided between his official labours and scientific investigation, he passed his days in placid serenity, while of late years, he indulged himself in summer excursions to his country residence, enjoying and luxuriating in the beauties of nature. Thus he lived, and thus, with a firm belief in the doctrines of Christianity, and a full reception of their happy effects, he prepared to die. After the glowing and affecting description by his beloved pastor and friend but a few days since, in this hall, of the state of his mind in the prospect of approaching dissolution, I feel that it is unnecessary for me to dwell on it.* He died in the hope of Heaven, on the 3d of December last, within a few days of accomplishing his 79th year.

> Philosopher, yet to no system tied;
> Patriot, yet friend to all the world beside;
> Ardent with temper, and with judgment bold;
> Firm, though not stern, and though correct, not cold;
> Profound to reason, or to charm us, gay,
> Learned, without pride, and not too wise to pray.

That the loss of such an individual should be felt and deeply regretted, is only paying due homage to departed worth. At his own Ithaca, where he died, and where his remains now repose, the inhabitants closed their places of business, and with one accord, attended the solemn procession to the grave. In their public testimony to his character, they speak of him as endeared to them by peculiar relations, while his official services and worth demanded their testimony of respect and gratitude. The State Society of Cincinnati, in the brief memorial that, alas, in too rapid succession, records the departure

* See note.

of the few surviving comrades of Washington, enumerated his military and civil services. Our Chief Magistrate, and our Legislature, with the Boards over which he presided, have each paid him the tribute due to his unsullied virtues.

The individual traits of his character may be inferred from the brief biography that I have now laid before you. He possessed, in a remarkable degree, the rare gift of a well-balanced mind. With great equanimity of temper he united firmness of purpose and decision in accomplishing. His friendship when once formed, was unwavering, and most devotedly reciprocated. In the domestic circle he was ever attentive, kind and affectionate.*

Fellow Members of the Institute,

The reverend gentleman who a few weeks since did us the honor to deliver the annual address, feelingly remarked, that the last year of our history as a society was not without affecting memorials. Besides the late Surveyor-General, another active and most excellent member and constant attendant, Charles R. Webster, has gone from us. It is a cheering thought amidst the changes induced by death, that we can point to some relic, by which our friends can be remembered, and their names transmitted to our successors. Thus, even in our collections, their memory will survive. Who indeed can gaze on the portion contained in yonder recess, without recalling to his mind the lineaments of departed greatness—who but will drop a tear over the cherished cabinet of De Witt Clinton?

Happy, if when our account is made up, we shall be found, each in his appropriate sphere, like our honored fellow members, to have done some service to the community, or the state. Then, whether in the morning of life, or at its fervid, bustling noon-day, or in the declining hour, we depart, our memories will be cherished, and our names "implore the passing tribute of a sigh."

* Mr. De Witt was thrice married.—1st to Miss Lynott—2d to Mrs. Hardenbergh, the sister of Colonel Varick, and 3dly to Miss Susan Linn, daughter of the Rev. Dr. William Linn.

NOTE.

[*The* Rev. Dr. Ferris *has obligingly favored me with the following extract from his Annual Address.*]

"The loss of two of the early and distinguished friends of the Institute, during the year, admonishes us to carry out our plans of activity without delay. The work of change is going on, and amid the innumerable uncertainties of life, we are called, to suffer no opportunities of usefulness in any of its pursuits to pass unimproved. And well may we take as our models in constant usefulness, the honored friends who have been removed.

The name of Charles R. Webster will be long remembered, as of one, who enjoyed the good feelings and confidence of this community and of the older inhabitants in the northern and western parts of this state, in a degree which has fallen to the lot of few. He was identified from his first settlement here, with almost every plan for the improvement of the literary and moral condition of this city and this section of our state, and an active participator in the labors of most of them. His devoted services in the Board of Trustees of the Lancaster School particularly, have secured for him the blessings of many who, cheered by his kind counsel, have made their way through hosts of difficulties and become most worthy members of society. He has left in the mementoes of his great moral and social worth, an inheritance far dearer to the feeling heart, than any perishable estate.

We have lost during the year, the venerable first Vice-President of the Institute, Simeon De Witt; a man endeared to a wide circle of friends, adorning every station he occupied in public, social and private life, and crowning every excellence with piety. It is not necessary that we should now dwell on the details of his protracted and useful course, as we shall soon be called to

hear these from one, whose long intimacy qualifies him to speak worthily of such a subject. Yet it is in place here, while we note his departure, to hold up his example as our model. He was the warm and active friend of this association, availing himself of every means of contributing to its advancement, and though considerably the senior of those participating in its various duties, coming to their aid with all the interest and enthusiasm of the most animated, and in his last excursions in his summer retirement seeking to add to our collections. Were he now among us enjoying the health of a few years since, I doubt not, he would not only approbate the enlarged policy which has been recommended, but be among the first to lend his personal aid to secure it success, and anew employ the pen, he knew so well to wield in literary or scientific or pious purposes. But he is gone—and though departed let his example live in our memories and be embalmed in our affections and animate us to perseverance,—let us seek to imbibe his spirit and catch his falling mantle. And happy, thrice happy shall we be, if favored with his years we may look back on a life so usefully employed. Happy if, as in his case, in our departure, science shall bless us, our country shall bless us, christianity shall bless us. Christianity? Yes, he, the scholar, the man of science, drank deep, at her perennial fountain. Her principles were the guide of his life, the stay and solace of his soul.* And his last days illustrated her heavenly triumph over all that is trying and harrowing in the separation of the ties which bind us to life, and in going down to "the valley of the shadow of death." This was his language to me a few months previous to his death: "I have looked with calmness on the approaching event. It has excited no

* The time of Mr. De Witt's connection with the Church cannot be precisely ascertained, yet there is reason to believe it took place many years since. For about twenty years he has occupied the place of an Elder in the Reformed Dutch Church, and at the time of his death was one of the most esteemed and influential members and elders of the 2d Dutch Church, Albany.

horror, nor even a depression of spirits. I have a confident and believe well founded trust, that I have become reconciled to my Heavenly Father through our Divine Redeemer and Mediator. And with the prospect of a life of eternal happiness, why should I deprecate death who is to open the gate." Language worthy the christian sage! He adds another to the proof of the solemn verities of the Gospel; another to the many illustrations of its consoling influence. To all our attainments may we add the heavenly wisdom he enjoyed.".

DESCRIPTION

Of a New Animal belonging to the CRUSTACEA, *discovered in the Antarctic Seas, by the author*, JAMES EIGHTS.

[Cabinet of the Albany Institute.]

GENUS GLYPTONOTUS. (EIGHTS.)

Animal composed of a head, thorax, and post-abdomen or tail, constituting in all thirteen distinct segments.

Head deeply inserted into the cephalic segment of the thorax. *Eyes* sessile, and finely granulate. *Antennæ* two pairs, placed one above the other, with an elongate multi-articulated filament. *Mouth* as in the ordinary *Isopods*, mandibles not palpigerous; the two superior foot-jaws expanded into a well defined lower lip, bearing palpi.

Thorax separated into seven distinct segments, the three posterior ones biarticulate near their lateral extremities; each segment giving origin to a pair of perfect legs, terminating with a strong and slightly curved nail.

Post-abdomen, or tail, divided into five segments, provided with neither styles nor swimmerets; the under surfaces each supporting a pair of branchial leaflets, longitudinally arranged, and covered by two biarticulated plates attached to the outward edges of the last segment, closing over them much in the manner of an ordinary bivalve shell.

SPECIES G. ANTARCTICA. (EIGHTS.)

ANTARCTIC SCULPTURE-BACK.

Animal perfectly symmetrical, ovate, elongate, and depressed. Teguments solid and calcareous. Color, brown sepia. Length, from the insertion of the antennæ, three and a half inches; width, one and three-quarters.

Head transversely elliptical, terminating at its lateral and anterior corners acutely, and incurved; anterior margin obtusely elevated, and arched each way to its centre.

Superior surface of the head ornamented with an imperfectly sculptured "fleur-de-lis;" posterior portion obtusely elevated, producing a marginal rim. *Eyes* small, reniform, indigo blue, and placed near the lateral and anterior portion of the head, so deeply impressed in the margin of the shell as to be easily distinguished from beneath. Inferior pair of *antennæ* longer than the superior, corresponding in length to the width of the head, transversely, from spine to spine; articulations four in number; last segment longest, the remaining three gradually diminishing in length as they proceed to the place of insertion; segments triangulate, with angular projections on their surfaces; edges of the angles, and articulating extremities rigidly spined. Terminating filament about the length of the basal articulations, gradually attenuated until it diminishes to a finely pointed apex. Superior *antennæ* half the length of the inferior, three-jointed, and terminating with an attenuated filament whose articulations are indistinct; segments angular, external one much the longest; extremities and angles likewise spined. *Mouth* with the labrum or upper lip hard and massive, resembling in form a reversed heart. The mandibles are without palpi, stout and osseous, tipped with a hard and black enamel. The maxillæ are furnished with the usual palpi. The lower lip, or superior foot-jaws when united, sub-cordate; its palpi five-jointed, snugly embracing the manducatory organs along their base, like a row of ciliated leaflets.

The *thorax* is composed of seven distinct segments, each one being beautifully ornamented on its superior surface by an elongated and sub-conic insculptation, forming a series, whose pointed apices almost unite along the longitudinal dorsal ridge. These segments are finely bordered along their posterior articulating edges by an elevated and continuous marginal rim, extending to the lateral extremities of the shell. The cephalic depression is likewise margined by an obtusely elevated border. Each segment

of the thorax gives origin, beneath, to a pair of ponderous angulated legs, composed of the ordinary parts. The three anterior pairs project themselves forward, and are closely compressed upon the inferior surfaces of the three foremost segments; they are monodactyle, with the nails incurved upon the anterior edges of the rather largely inflated penultimate joint. Each joint is furnished at its articulating extremity with rigid spines; the inner edges of the penultimate joint, together with those of the three adjoining, are provided with a double row of tufted cilia, disposed diagonally, and much resembling in appearance the arrangement of hairs in an ordinary brush. The four posterior pairs of legs are directed backwards, strongly triangulate, stout and ponderous, terminating by a slightly curved nail; their length is nearly equal, but they gradually increase in thickness as they recede toward the tail. The basal joints are large and inflated; the remainder regularly angulate. The extremities of the articulating joints, and edges of the two inferior angles, are each provided with a series of tufted and rigid spines.

The *post-abdomen* is composed of five segments. The four anterior ones are much smaller than those which constitute the thorax, but greatly resemble them in form, being ornamented on their superior surfaces with similar insculptations, though but slightly defined. Each of these segments is provided beneath with a pair of articulated pedicels, which furnish a support to the bifoliated bronchial leaflets. These leaflets are arranged longitudinally one upon the other, and are entirely concealed by the biarticulated plates of the caudal segment; they are subovate and elongate; the outward ones smaller than those which they cover, and are nearly surrounded by a fringed cilia, most conspicuously developed along their inner margins. The second pair are each supplied with an elongated style, extending almost to the termination of the caudal segment. The terminating segment is large and

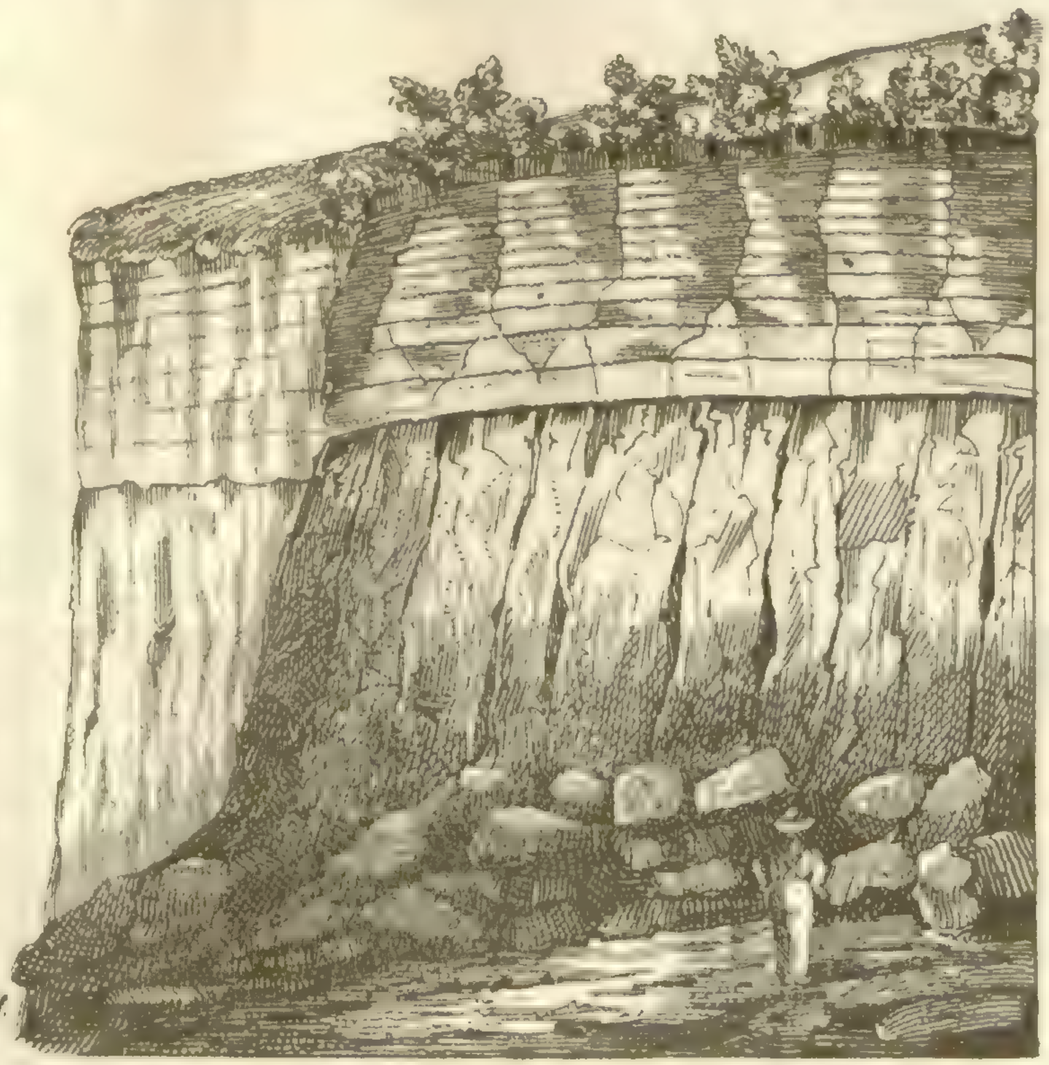
triangular, giving attachment to the biarticulated plates at a single point on its outer margins near the base, which enables the animal to close them together in a line along its centre beneath. These plates are about the length of the segment, and of a triangulate form, each one having near its termination a small oval articulation. The segment and marginal plates are slightly inflated along their external edges, producing an obtusely elevated border.

The segments constituting the thorax and post-abdomen are supplied by a central, angular, and elongated knob, which, when united, form a prominent dorsal ridge, gradually diminishing in its backward course, and forming a sharp elevated line along the caudal segment, terminating at its extremity in a short and obtusely pointed spine.

This beautiful crustacean furnishes to us another close approximation to the long lost family of the *Trilobite*. I procured them from the southern shores of the New South Shetland Islands. They inhabit the bottom of the sea, and are only to be obtained when thrown far upon the shores by the immense surges that prevail when the detached glaciers from the land precipitate themselves into the ocean.

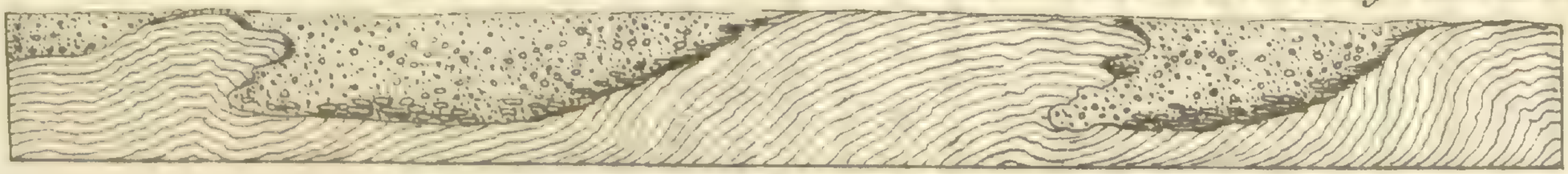
Section of the Post Tertiary Formation.

2.



Section. Lower Portion Clay. Van Woert. St.

3.



Transverse Section shewing the Grooved Trenches.

LITH. OF RICH.D H. PEASE, ALBANY.

JAS. EIGHTS, DEL.

C. Ferruginous sand.
Marly clay, upper portion
D Imbedded sand and gravel.
E. Water.
F. Marly clay. Central portion.
G Marly clay, lower portion.

H. Boulder system.
I. Small concretions.
J. Fault occasioned by a slide.
K. Large concretions.
L. Sandstone and shales.

OBSERVATIONS

On the geological features of the POST-TERTIARY *formation of the city of* ALBANY, *and its vicinity.* BY JAMES EIGHTS.

Accepted March 4, 1852.

The Helderberg mountains occupy a position comprising about one-third part of the entire county of Albany. They lie in a southwesterly direction from the city, twelve miles distant; and may be seen, on a clear day, to form a beautiful feature in the landscape scenery from any of the public highways. The other portions of the county present the appearance of a uniform level plain of sand, almost completely covered over by a dense growth of pine, with oak, and other deciduous trees; but a closer inspection, particularly along the courses of the Hudson and Mohawk rivers, and most of the minor streams that discharge their waters into these channels, will at once exhibit the entire base of the country to be composed of Hudson river sandstones and shales. Over this an ancient drift or boulder system sometimes prevails, succeeded by a thick deposit of blue and drab-colored clays; the latter embracing all over among its different strata, innumerable beds of sand and gravel, the whole mass belonging evidently to a more recent, or post-tertiary period. Above this is spread out a continuous stratum of yellow ferruginous sand, which forms the surface of the plain; and however level may appear to be the surface of this plain from a distant point of view, a nearer examination will disclose frequent hills of sand and depressions of morass, the former drifted up by the winds at a period of time long before vegetation had scattered a single seed upon the soil.

The general elevation of the surface of this plain has been ascertained, by actual measurement, to be about two hundred and sixty feet above the tidal wave.

The *clays* which constitute this formation are about one

hundred feet in thickness, and are for the most part disposed in a horizontal position. Its lower portion, where it rests directly upon the Hudson river shales and sandstones, is of a firmly compact nature, owing no doubt to the heavy pressure of the superincumbent mass; but, as we ascend in the series, its stratification begins to develop itself, at first at distant intervals, but, on approaching the surface, these intervals are seen gradually to diminish in thickness, until they terminate in layers so exceedingly fine as scarcely to be discernible.

Whenever this stratification first makes its appearance, the separating material is a remarkably fine-grained pulverulent sand of a light silvery tinge, closely approximating to white: and this is continuous throughout the remaining portions of the formation. It is chiefly among some of these seams of sand that the indurated calcareous concretions, so frequently met with in this vicinity, originally derived their existence. These seams of sand, as they approach the surface of the soil, are sometimes seen to expand in such a manner as occasionally to admit a stratum of a fine-grained yellowish sandy clay, from two to four or more feet in thickness, the lower parts of which not unfrequently become interstratified with fine layers of the blue variety beneath, but most generally it is isolated and compact in its texture.

The general color of these clays is of a deep blue or violet, closely approaching a neutral tint; but as we ascend in the series, it is seen by degrees to lose its fine uniformity of shade, and at length to assume a more variegated aspect. From the deep stone-blue beneath, this entire mass, in its progress upward, exhibits among its numerous strata almost all the other hues in nature, and in oft repeated alternations; not blending imperceptibly one into the other, as is so frequently seen, but so arranged in distinct bands as to present an appearance not unlike the striped ribands on a lady's dress.

This display of colors retains its beautiful appearance until we approach the surface of the clay, where, from long exposure to the influences of sunlight and the weather, its whole upper portion, whenever revealed to the eye, becomes one uniform tint of yellowish drab.

This upper division, or *drab-colored variety* of the marly clay, is usually separated from the horizontal, variously colored and dark-stained mass beneath, by a single imbedded deposit of fine-grained, deeply tinged yellow sand, amounting in many places to some considerable degree of thickness. This drab-colored portion of the clay constitutes about one-third of the entire formation, and it is through its numerous layers alone that the disturbing agencies appear to have exerted their most powerful energies. The heavy primary boulders and other detrital materials from the northern section of the State, during the violent agitation of the waters which drained and left bare so large an extent of our tillable lands, have grooved out deep and parallel trenches, running in a direction nearly north and south, and, after disrupturing the strata and giving origin to those many faults and slides which everywhere prevail, may now be seen piled up in the greatest profusion all along the base of the heavy lime and sandstone cliffs which form the northern termination of the Helderberg mountains.

This disrupturing agency has, in many instances, forced its way between the strata of this variety of clay at various elevations; sometimes raising the overlying mass so as to cause it not unfrequently to assume the regularly arch-like form, and leaving the intervening spaces completely filled with fine-grained gravel or beds of sand; at other times it has fairly inverted the strata, and thrown them about in every variety of confusion, producing at the same time those singularly twisted or tangled appearances which so often perplex the geologist in his endeavors to trace them clearly out. Immediately beneath this dis-

turbed portion of the deposit, the strata are again seen to resume their usually horizontal position.

In several situations, and always in connection with this superincumbent mass, are to be observed decided evidences that some partial or local currents of water have drifted the fragments of these broken-up strata, and quietly deposited them over the surface of the yellow ferruginous or overlying sands. These fragments have their angles but slightly abraded, and consequently could not have been brought to their present position from any great distance; and most commonly they can easily be traced to the parent cliff, almost in the immediate vicinity of their occurrence.

When this disruptured mass of clay comes in direct contact with the subordinate strata upon which it rests, it generally presents the appearance of being placed in an unconformable position by the disturbing agencies, and would, from its absence of color and deranged condition, most readily deceive the eye of an inexperienced observer, and induce him to believe that it had been the result of a distinct and more recent deposition; but a closer inspection, however, will very soon convince him that they are identically of the same age.

The succeeding *portion* of this formation occupies a central position, amounting to about a third part of its entire thickness. It is composed of innumerable strata of a remarkably fine-grained, unctuous, marly clay, separated throughout its whole extent by numerous thin seams of a silvery white pulverulent sand. These strata are, with rare exceptions, arranged in a horizontal position, and the numerous layers by which they are constructed are each deeply tinged with red, yellow, and blue, including all the various modifications of tint, presenting to a spectator a richly striped and exceedingly beautiful appearance when freshly exposed to the open light of day. These colors are usually repeated in the strata throughout its

entire extent, but they gradually diminish in thickness as they proceed upward. It is in some of the separating seams of this division that the leaves and stems of plants have been discovered.

The *inferior portion* of this deposition of clay, where it closely approximates to the supporting indurated rocks below, when freshly exposed to view, assumes the appearance of a compact cohesive mass, the particles of which it is constructed being of an exceedingly fine nature; but when for a few days it becomes subject to the direct influences of the weather, it most generally exhibits a tendency to separate vertically into a rudely columnar structure, much resembling in general aspect many of the granites of our Eastern States.

This formation of clay rests in an unconformable position upon the Hudson river sandstones and shales beneath; but in some instances a more ancient drift or boulder system intervenes, the currents of which swept in a southerly direction over the principal portion of the State of New-York, producing those numerous scratches which are so distinctly visible upon the surfaces of most of its rocks, and giving evidence that a long period of time must have necessarily elapsed of tranquil waters reposing over this region of country, in order to leave so uniform a deposition of clay, amounting to about one hundred feet in thickness. It was after the completion of this deposit, that the violent action took place which tore up and dislocated the upper portion of this formation.

The numerous beds of *gravel* and *brown sand* which are inclosed within this upper or drab-colored variety of the marly clay,—and which, no doubt, were the agents employed in the opening and upturning of its strata,—are of a different nature from the overlying formation of yellow ferruginous sand. The materials which characterize these deposits are for the most part of a greenish brown color, and appear all to have been derived from the primary

ranges of the north; not a single fragment of the extensive lime and sandstone formations of the Helderberg mountains, twelve miles to the south, has ever yet been detected among them. The sands are almost completely composed of rounded particles of transparent quartz, gneiss, hypersthene, hornblende, and augite, disseminated in about equal proportions; the latter named minerals giving to the entire mass that greenish-brown color that it invariably presents whenever it becomes exposed to the sight, and which readily distinguishes it from the overlying ferruginous sands. Their mineral characters and abraded angles also denote their transportation by water from some far distant region. It is rarely indeed that any other mineral ingredients can be discovered among their particles, if we except some occasional fragments of flesh-colored feldspar and oxides of iron.

Whenever any of these imbedded materials are freely exposed to view by the numerous diggings, and in the ravines along the shores of the various streams that discharge their waters into those of the Hudson and Mohawk rivers, they invariably present an arrangement of large and small particles in a series of waved lines or angular markings, as if disturbed or deposited from gently moving or by violently agitated waters. This in all probability was the case when the drainage took place, and the plain became permanently dry. These peculiar characters most strikingly resemble in appearance those of a no doubt similar nature, which are most generally to be met with on the exposed edges of many of the more ancient sandstones: a fact strongly impressing on our minds the conviction that nature is governed at the present day by the same laws by which she operated in times far remote.

In many places it would appear, that after this brown arenaceous matter had been permanently arranged through the clay in the manner we now behold it, slight and limited depositions of an exceedingly fine-grained, light yel-

lowish colored sand took place, which are at present to be seen in various situations, protruding as it were from the roofs of these excavations, and forming a singularly distinct contrast to the dark stained material into which they are enclosed. From the circumstance that these apparently isolated masses of sand never exhibit those undulating lines and angles so characteristic of the other and associate deposits of the kind, I should form the conclusion that they had derived their origin from the surface waters, slowly and gradually percolated through the numerous thin seams or shrinkage fissures in the overlying and disruptured clays; for I can conceive of no other or more simple process to account for their present appearances.

Sometimes the rounded pebbles which constitute the gravel, and which are at all times to be found in connection with these imbedded brown sands, are cemented firmly together by a copious deposit of carbonate of lime, to such a degree as to form extensive beds of calcareous conglomerate, or pudding-stone, the lime being derived from the percolating waters containing it in solution; but this only occurs when the broken up strata of drab-colored clay are either in their immediate vicinity, or directly above. In other instances, the cementing ingredient is the sulphuret of iron, which then renders the united mass so exceedingly hard as to destroy the tools of the workmen employed in its excavation.

The marly clays of this formation, with their imbedded contents, are sometimes subject to frequent and extensive slides. They are of common occurrence all over the sloping sides of the numerous and deeply cleft ravines which open from the surface of the plain, down to the shores of the different streams. To an individual looking from an eminence across one of these ravines to the hill-side beyond, it will most generally appear to be composed almost entirely of a succession of irregularly formed terraces,

rising one above the other, until their termination at the surface of the plain. These slides are of various dimensions, some of them extending to a considerable magnitude; and when their edges become exposed, from excavations for the purpose of obtaining the brown sand, or the clays in which it is embraced, the facts there developed might easily deceive the eye of a spectator, by disclosing to his view the appearances of a repetition of similar deposits widely separated from each other in position, whereas they are in reality a part and parcel of the same stratification.

Most of these slides exhibit evidences of a very slow and gradual movement of the mass in their progress onward. In many situations, the beds of sand and gravel which they contain, and the various strata of clay which compose their structure, however distorted and disarranged they may appear, disclose no further indications of any disturbance, either by fracture or otherwise, than those produced at the time of their original deposition: they perfectly correspond in every respect with the same formation in its natural position many feet above. In other instances, where the movements have evidently been more rapid and irregular in their action, the different materials of which they were constructed appear to have been fractured and tumbled about into the utmost degree of confusion. In several other situations, where excavations for economical applications have been made along the sloping sides of these ravines, the peculiar action of the slides is well exhibited. In frequent instances, most generally after heavy torrents of rain, the progress of railroad cars has been seriously impeded by prodigious quantities of these materials having been suddenly thrown over the track, so as to require the constant employment of a large number of workmen in their removal. The only method to remedy such an inconvenience is, if practicable, to construct the embankment from the edge of the road at the

same slope that nature always adopts in her arrangement of particles of earth on the hill-sides, which is at an angle something less than forty-five degrees with the horizon: it then remains in a quiet state until the surface is completely covered over by shrubs and herbaceous plants, which are perfectly competent, by the ramifying entanglement of their rootlets, to secure permanently the banks from all further encroachments. Whenever the angle is of any greater degree, these slides must invariably take place.

The *calcareous concretions* embraced in the clays of this formation present a very singular feature in their construction. They are exceedingly common among some of its strata; and from the peculiar variability of their forms, it becomes very difficult to conceive any method by which to communicate a definite idea of their remarkable appearances, other than by a reference to the specimens themselves. They are always limited to the upper portion of the deposit, or that part most commonly selected for the manufacturing of brick. From the size, color, and their geological position amid the clays, they will easily admit of a separation into two distinct varieties: the first, or smaller of these, are most generally of a light yellowish color, about an inch or an inch and a half in their diameters, and are exclusively confined to the divisional seams of sand in the upper or disruptured portion of the series. The second and larger variety, as far as observation has hitherto extended, appears to be restricted to a single stratum of the middle, or variegated portion of the clays near to its upper termination, and situated about four feet from its junction with the overlying or disturbed member of the deposit: they are for the most part about three or four inches in diameter, with a length frequently of more than a yard, and of a deep stone-blue color. Both of these varieties sometimes present the same peculiarities of form, but they differ considerably in their chemical analysis.

By an individual unacquainted with the manner in which these concretions have been produced, particularly those that assume the rounded form, so great is their resemblance, they might very easily be mistaken for water-worn fragments of some firmly indurated rock; and had the material of which they have been constructed been somewhat more copious, there can be but little doubt but that a solid stratum of silicious limestone would have been the result, occupying a position in conformity with the strata of this heavy mass of ductile clay.

These clay-stones, as they are most commonly called, or calcareous concretions, have frequently been the cause of some considerable speculation among geologists, in endeavoring to account for their production. The manner in which they have been formed is distinctly perceptible everywhere, among the various and extensive diggings which have thrown them open to the light of day. The delicate fibres of the roots of the different trees of the forest that at one time completely covered the surface of the soil, have, in innumerable instances, penetrated to a very considerable distance beneath. It was along these roots that the moisture from the surface, highly charged with carbonic acid gas, readily found its way, collecting the lime and other necessary ingredients in its descent, until its arrival at one of these seams of sand; here a deposition commenced, and the particles gradually arranged themselves in a concretionary form around a nucleus of ligneous fibre.

Whenever these concretions have been examined in a perfect state, this nucleus, or remnants of it, has invariably been found, exhibiting no other change in its appearance than that of a brownish stain given to it by the oxide of iron. Sometimes two or more of them may be seen united together; at others, where the deposition seems to have been far more copious, the liquid mass appears to have spread out to some considerable extent, giving origin to

those stony plates of the same nature which are always to be found associated with them. It is also not an unusual circumstance for many of them to be marked with circular depressions, when, after a short exposure to the atmospheric influences, they readily disunite, the central portion falling out, carrying with it the woody nucleus that they contained, and leaving the concretions in that regular ring-like form that they so commonly assume. In some instances, while undergoing the necessary process of induration, the particles appear to have shrunk from the centre to the circumference, causing those radiating fissures which afterwards became filled by segregation with calcareous spar; in this case, these concretions become perfect septaria.

When these carbonized waters flow through the pulverulent sands which separate the layers of clay, and free from the influence of the roots of neighboring plants, they continue for several feet in length to form those indurated plates of concretion that are so frequently to be met with, strewed all over the surface of the ground, far beneath the level of their original deposition.

The lower, or *amorphous portion* of this formation, not being divided into distinct stratification, nor ever having been penetrated by the roots of plants, it consequently would rarely if ever contain these concretionary forms, which seems to be the case; and from the preceding description it will be seen that although perfectly embraced in the layers of the clay to some considerable depth, they may with strict propriety be considered as belonging to a more recent period, having been constructed long after the deposition had become complete, and vegetation had for some time flourished in the soil upon its surface.

Minerals, in a distinct form, are of rare occurrence in this formation. Besides sulphuret of iron in nodular masses with central radiations,—which are not unfrequent, —some large and beautiful crystals of selenite, or sulphate

of lime arranged in a stellular manner, are sometimes found. This latter mineral no doubt derives its origin from the decomposition of the iron; the sulphuric acid produced, readily uniting with the lime contained in the clay, would speedily accomplish this effect. In some situations where magnesia prevails as an ingredient, epsom salts in acicular crystals has been the result, and was produced in all probability by the same chemical agency.

In one of those thin seams of fine sand that separate the strata of clay, about fifteen feet beneath the surface of the soil, is to be found the remains of a vegetable much resembling in appearance the leaves and stems of the *Mitchella repens*, which now thrives most luxuriantly all over the surface of the pine plains in this vicinity. These leaves have undergone but a slight degree of change in their nature, still retaining all the flexibility of the more recent plant. This is the only instance of an apparent fossil remain having been found connected with this formation in the neighborhood of our city; but Professor Emmons has procured, from what he considers as equivalent to its upper layers, along the shores of Lake Champlain and the St. Lawrence river, many feet above the reach of the tidal wave, the fossil remains of marine shells that still have an existence along the shores in the neighboring seas, together with some few that belong to the waters of a more boreal or arctic region. The only ready method to account for the paucity of fossils in this deposit, extensive as it appears in this section of country, is, to consider it as having derived its origin from the waves of a deep inland estuary or arm of the sea, with numerous streams of fresh water continually discharging themselves into its basin; by which means the water would soon become too brackish for animals from the land, and much too fresh for those belonging to the sea.

Fibrous rootlets of plants, still retaining all the characters of a more recent vegetation, are to be observed in al-

most every stratum of the clay, to the depth of some fifteen or more feet from the surface, ramifying in every direction over the vertical faces of the cliffs. In many situations they have often been mistaken for ancient fossil remains, but a slight inspection will most readily disclose their recent origin. They have, in many instances, been traced to the stems of still surviving trees.

The clays of this formation have, for a great length of time, been extensively made use of for the manufacturing of brick. With now and then a rare exception, the entire city of Albany has been erected from the material upon which it stands. In many places, this clay contains sand sufficient to constitute an excellent mortar for the purpose; but most generally it is necessary, particularly in its lowest division, to give additional sand to its composition. It is likewise capable of affording a fine material for tile making; but the demand for such an article has been so limited, that no individual, until very recently, has considered it of sufficient consequence to embark in the enterprise. With a little more care in the tempering, I should think that this material might easily be moulded into elegant ornaments for decorating the door ways, windows, and even the entire fronts of dwellings, so as to give to the structure composed of it a very chaste and highly beautiful appearance, and that too at a far more reasonable rate than is now employed for the sandstones and marbles at present in such general use.

Quite recently, an attempt has been made to manufacture fine glass from these clays; but by a reference to the table of analysis, it will be seen that some of the most important ingredients, if there at all, are not in sufficient quantity to produce any thing more than a common variety of coarse bottle glass, of little or no consideration whatever. In conjunction with some of the metallic oxides, however, it has produced some very beautiful variegated door knobs; but the expense attending their manufacture

has far exceeded the idea of any thing profitable. It is occasionally made use of for coarse pottery, and many of the poorer class of our citizens make use of it, with a solution of glue, for washing the walls of their dwellings.

From the central portion of this formation, and from amid the various colored strata, is obtained the material so much in value at the earthen-ware factories in our neighboring States, for the purpose of glazing their numerous productions; they pay for it at the rate of one dollar the barrel, and it is most admirably adapted to the use. All that is necessary, is to dip the article to be glazed into a solution of this clay, formed with water to the consistency of cream; the lime constituting one of the ingredients, readily performing the action of a flux to the aluminous portion; and when the article is subjected to the heat required, it produces all the effects that become necessary to accomplish the object.

This blue clay, in a moist state, is a most admirable article for the preservation of the seeds and roots of plants, particularly during long journeys by land and distant sea voyages. All that is necessary, is to cut it into thin slices, and deposit the seeds and roots between them, at the same time packing the whole mass firmly together. In this way, these vegetable productions will retain their vitality for a number of years, in consequence of the exclusion of air, and the retention of a sufficiency of moisture for their preservation.

The finest portions of the imbedded brown sands and gravel are much employed, when united with lime, in the composition of mortars and other plasterings, and they are also used for moulding purposes in furnaces; while the boulders and other angular masses, are broken up for the construction of roads.

The calcareous concretions have not, to my knowledge, been appropriated to any practicable purpose; but it has been suggested, from their chemical composition, that

they might be usefully employed as a delicate water cement, when properly prepared.

Over this heavy formation of marly clay, and likewise constituting the surface of the extensive and elevated plain which forms so conspicuous a feature in the scenery between the city of Albany and the Mohawk valley, is spread out a thick deposit of *yellow ferruginous sand.* It leaves, however, in many places, denuded portions of the clay protruding far above the soil; and also, fills up those deep grooved trenches, which have been torn out by the rushing waters loaded with detrital matter from the north, in such a manner that it can only be seen to advantage along the deep cuttings, and in the banks of the numerous streams that discharge their waters into those of the principal rivers.

This sand is very unevenly spread over the surface of the clay, so that it becomes exceedingly difficult to form a just conception of its thickness, it having been drifted and blown about into variously shaped knobs or hills, some of which attain an elevation some distance above the general level of the plain; about thirty feet, however, I should consider in all probability a fair estimation of its greatest depth.

This yellow sand is chiefly composed of silicious particles having an external coating of oxide of iron, which gives to it that deep ochreous appearance which it everywhere presents, when not exposed to the direct influences of atmospheric action; small fragments of magnetic iron in the form of sand, with feldspar and mica, are commonly found disseminated through it, and more rarely garnets and pyroxene.

After heavy showers of rain, the surfaces of roads running through this plain are literally strewed with small concretions of this brown oxide of iron, these, upon being washed into the low marshy depressions which are every where abundant, unite themselves together by the

tendency they have to concrete, and give origin to those large quantities of bog ore which have hitherto proved so great a source of profit to the possessors of the land. In this way, the formation of this ore may be considered as of daily continuance, and consequently on the increase. A few years since, this iron was shipped in large quantities to the city of Philadelphia for stove castings, and for the purpose its quality most admirably adapts it.

Beds of *shell marl*, either covered or surrounded by margins of peat, are not unfrequently to be met with in the marshy depressions of this plain; both of which substances, when judiciously used as manures, have proved of essential service to some of the lands in the vicinity; but at other times they have been the source of some considerable evil, merely in consequence of the absence of a little chemical knowledge of the nature of the soils upon which they were improperly introduced.

The rains that descend and percolate these yellow sands, are, in many instances, immediately thrown off by the sloping surfaces of the impervious clays beneath, and again make their appearance in the form of *copious springs* among the various depressions scattered over the surface of the plain. From these springs, the numerous minor streams that ramify the country derive their origin. But many of these waters find their way into basins or reservoirs at the bottom of the torn out trenches and disrupted portions of the clay, from whence our farmers most generally obtain their supplies; and they consider themselves extremely fortunate when, in digging their wells, they at the first attempt succeed in reaching one of these repositories. In these researches for water, they are almost altogether guided by chance, and oft times wonder that their labors are attended with such ill success. The accompanying diagram is taken from an actual section at one of the many excavations made in the neighborhood of our city, and will in a great measure aid in illustrating

the theory of springs, and readily explain the cause of failure and success in these undertakings for water.

An individual boring for water at A, would be sure of obtaining it on passing through the yellow sand, and approaching the impervious floor of clay; whereas at B, a few yards distant, he would find none whatever, because the rains which percolate the sand at this place, flow off immediately on reaching the sloping surface of the clay. Now should he not be satisfied with the quantity or quality of the water procured at A, and resume his labors through the impervious floor, he would, in all probability, on penetrating the imbedded sands, lose that which he possessed; but on proceeding still further into this mass, he will in a short time be enabled to find it in the greatest profusion; whilst at B, he might proceed through the entire formation, without discovering the smallest measure of it. It is from this peculiarity of the structure, that the borings for water on the "Pine plains" are so uncertain, and of such a mysterious nature to our farmers, and which renders them so liable to the imposition of swindlers.

The waters contained in these imbedded sands are most generally of a finer quality than those which have percolated through the yellow ferruginous mass above, in consequence of the latter abstracting large quantities of iron in their passage through, which always renders them hard and unpleasant to the taste.

It would seem natural to suppose that the larger the size of the disrupting boulders drifting over the surface of this plain, the nearer they would be found deposited to the parent rock from whence they derived an origin; and the smaller the particles, the further they would be transported by the action of the moving waters. This law is unquestionably correct over an extended surface of level country, where the water had a comparatively quiet flow; but in this particular instance, it would appear to require some degree of modification, for the more numerous and

larger boulders, after having torn up and dislocated the upper portion of the clays, in their passage along the surface, may now be seen in prodigious numbers, and of the greatest magnitude, lying up against the elevated range of mountains to the south, whilst rare indeed is the circumstance to find a solitary fragment of any considerable size any where along the intervening space.

The various facts detailed in this communication, when attentively considered, would appear to favor the hypothesis advanced some years since, that by some powerful convulsion of nature, the barrier was burst asunder which pent up and confined the waters of this inland estuary or arm of the sea, and caused an almost instantaneous drainage of the land. Such being the case, a violent rush or current would be the result, sufficiently powerful to sweep along at a rapid rate, even the largest of the boulders in question, and by that means easily to disrupture the surface of the clay, and produce all the effects that we at present behold. But still, an adequate supply of water seems to have remained, in order to evenly disseminate the yellow sands over the irregular and broken up surface long ere the land had become permanently dry.

The following results of *analysis* have been carefully obtained, expressly for this communication, by Dr. James H. Salisbury, of this city.

ELEMENTARY SUBSTANCES.	Marly clay. Lower portion.	Marly clay. Middle portion.	Marly clay. Upper portion.	Sand. Middle portion.	Concretions. Large blue. Mid. portion	Concretions. Long blue. Mid. portion.
Organic matter,	4.60	5.04	6.40	1.32	3.64	7.60
Carbonic acid,	1.25	1.52	0.64	2.44	8.44	9.24
Silica,	67.50	68.80	67.20	78.10	44.40	42.00
Per oxide of iron and alumina,	17.10	14.40	18.44	9.98	7.72	9.88
Phosphoric acid,	0.05	0.04	0.04	trace.	0.08	0.08
Lime,	5.65	4.28	3.40	4.16	26.88	21.44
Magnesia,	0.35	0.28	0.20	0.10	0.28	0.28
Sulphuric acid,	trace.	0.08	trace.	0.14	trace.	trace.
Chlorine,	0.25	0.04	0.12	0.06	0.24	trace.
Potash,	2.20	3.72	2.20	2.72	5.92	6.92
Soda,	0.60	1.44	0.68	0.42	1.80	1.72
Total,	99.55	99.64	99.32	99.44	99.40	99.16

This analysis of the *small yellow concretions*, from the upper portion of the clays, was made in the State Laboratory, under the direction of Professor Emmons.

Water, ...	6.28
Organic matter, ...	1.70
Silica, ...	30.88
Free alumina and per oxide of iron, ...	9.42
Carbonate of lime, ...	58.98
Magnesia, ...	0.22
Total, ...	99.42

EXPLANATION TO ARTICLE IV. THIS VOLUME.

In the second number of this volume, I have described a Crustacean, under the new genus *Brongnartia*. A few years later the figure of a *Serolis* (Leach,) was given in Dr. Buckland's volume of the Bridgewater Treatise; though much smaller in size, every one must be struck with the close resemblance of the two. At the time my article on this animal was published, there was nothing but a description of the genus *Serolis* that I could have access to, and in all the works containing it, it was described as being destitute of *Palpi* to the mandibles. In the *Brongnartia*, these organs are strikingly palpigerous, a distinguishing character, which must remove it, not only from the genus *Serolis*, but also from the *order* to which that animal belongs.

JAMES EIGHTS.